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ARCHAEOLOGICAL RESOURCES OF THE SANTA TERESA STUDY AREA, SOUTH-CENTRAL NEW MEXICO

Cultural Resource Management Division
Arizona State Museum
University of Arizona

Bureau of Land Management
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ARCHAEOLOGICAL RESOURCES OF THE SANTA TERESA STUDY AREA, SOUTH-CENTRAL NEW MEXICO

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TABLE OF CONTENTS

Page

CHAPTER

1 THE SANTA TERESA PROJECT 1
John C. Ravesloot
Project Organization and History 4
Report Organization 5

2 GEOMORPHOLOGY OF THE STUDY AREA 7
Jonathan O. Davis and Fred Nials
Landforms 7
Stratigraphy 10
Procedures 10
Stratification Scheme 11
  1A--Mesquite Coppice Zone, Pleistocene-Floored Blowouts . . 13
  1B--Mesquite Coppice Zone, Partial Sand Sheet Cover . . 14
  1C--Mesquite Copice Zone, Relict Large-Scale Deflation Basins 15
  1D--Mesquite Coppice Zone, Escarpment Edge Coppice Dunes . 15
  2--Inactive Sand Sheet Zone 16
  3A--Parabolic Dunes Zone, Yardang-Linear Blowout Subzone . 17
  3B--Parabolic Dunes Zone, Low-Relief Dunes Zone 18
  3C--Parabolic Dunes Zone, High-Relief Dunes Subzone 19
  3D--Parabolic Dunes Zone, Yucca Coppice Dunes Subzone . . . 20
Conclusions 20

3 PREHISTORIC PERIOD RESOURCES AND RESEARCH GOALS 23
John C. Ravesloot
Previous Research 23
Culture History 24
  Paleo-Indian Period 24
  Archaic Period 24
  Formative Period 25
    Mesilla Phase (A.D. 200-1100) 26
    Dona Ana Phase (A.D. 1100-1200) 28
    El Paso Phase 28
    Explanatory Models 29
Inventory of Previously Recorded Resources 34
Research Goals 38
Research Problems 38
  Chronology 39
  Preceramic Occupation 40
  Settlement Classification 41
  Land-Use Patterns 41
  Conceptual and Methodological Considerations 42

TABLE OF CONTENTS (continued)

Page

4 HISTORIC PERIOD RESOURCES AND RESEARCH GOALS 43
Lyle M. Stone
History 43
Study Area Historic Sites 45
Historic Research Problems 46

5 METHODOLOGY 49
John C. Ravesloot and Cynthia Irwin-Williams
Archaeological Units and Human Hunter-Gatherer Behavior in the Southwest 49
  Nonsite (Off-Site) Archaeology 51
  Density Dependent Method 51
Field Methodology for the Santa Teresa Project 53
  Geomorphologic Basis for Areal Sampling 53
  Field Strategies 54
  Phase I 54
    Isolated Artifacts 57
    Isolated Manifestations 57
    Sites 57
  Survey Procedures 57
  Field Laboratory 61
  Phase II 63

6 RESULTS OF THE INVENTORY 65
John C. Ravesloot
Survey Coverage 65
Description of Traditionally Recognized Resources 65
  Sites 67
    Site Size 67
    Features 67
    Distribution of Sites by Geomorphological Zones 71
  Isolated Manifestations and Isolated Artifacts 73
Chronology 73
  Ceramic Cross-Dating 76
  Projectile Point Associations 77
Temporal Components 77
  Obsidian Hydration Dating 79
  Radiocarbon Dating 79
  Discussion 81
  Measuring Assemblage Diversity 82

7 RESULTS OF ANALYSIS: LITHICS 93
Patricia A. Hicks
Description of Raw Material and Lithic Implements in the Santa Teresa Collection 93
  Report Organization 95
Lithic Raw Materials at Santa Teresa 95
  Geologic Origins of Lithic Materials in the El Paso Area . 96
  Regional Lithic Sources 98
  Lithic Raw Materials at Santa Teresa 99

TABLE OF CONTENTS (continued)

Page

The Use of Lithic Raw Materials as Chronologic Indicators. 107
Implement Categories 117
Implement Category Descriptions 118
Manuports 118
Ground Stone and Pecked Stone 125
Flaked Stone 135
Cores 135
Flakes 139
Morphofunctional Tools 142
Summary 151
Projectile Points in the Santa Teresa Assemblages 153
Augustin 154
Chiricahua 160
Pelona 161
Shumla 164
Beckett Type 6 165
San Pedro 166
Small Side-Notched 168
Maljamar 169
Beckett Type 9 170
Beckett Type 10 173
Miscellaneous Types 178
Culture-Historic Indications of the Projectile Point Collection 191
Summary 192

8 RESULTS OF ANALYSIS: CERAMICS 193
Patricia L. Crown
Typology 193
El Paso Brown 193
Jornada Brown 195
Unspecific Brown 195
El Paso Corrugated 196
Red-Slipped Brown 197
El Paso Bichrome and Polychrome 197
Chronology 198
Worked Sherds 201

9 RESULTS OF ANALYSIS: FLOTATION 203
Thomas C. O'laughlin
Methods 204
Results and Discussion 206

10 RESULTS OF ANALYSIS: HISTORIC MATERIAL CULTURE 211
Marilyn B. Saul
Land-Use Activities 211
U.S.-Mexico Boundary 211
Railway Construction and Use 212
Ranching 213
Military Use 213

TABLE OF CONTENTS (continued)

Page

Summary 214
Historic Artifacts 216
Glass 216
Production 217
Mold-Blown Bottles 217
Machine-Made Bottles 218
Finishes 219
Maker Marks 219
Chesebrough Manufacturing Company 222
Lummis Glass Company 222
Owens-Illinois Glass Company 222
William Franzen and Son 222
Vidreira de Monterrey 222
Illinois Pacific Coast Co. 223
User Marks 223
Summary 223
Ceramics 223
Ammunition 228
Cartridges 229
.25 Caliber 229
.30 Caliber 229
.32 Caliber 229
.38 Caliber 229
.44 Caliber 229
.45 Caliber 231
.50 Caliber 231
Shotgun Shells 231
Bullets 231
Other Metal Objects 233
Cans 233
Knives 234
Buckles 234
Miscellaneous 234

11 PREHISTORIC LAND USE AND SPATIAL PATTERNING IN THE MESILLA BOLSON 235
Christopher Pierce and Stephen R. Durand
Locational Patterning in the Santa Teresa Study Area 240
Activity Patterning in the Santa Teresa Project Area 245
Summary 252

12 SUMMARY 253
John C. Ravesloot and Cynthia Irwin-Williams

APPENDICES

Appendix A - Site Maps A-1
Appendix B - J-Scores by Site B-1
Appendix C - Isolated Manifestations C-1

TABLE OF CONTENTS (continued)

Page

Appendix D - Spatial Distribution and Frequency of Santa Teresa Ceramics; Santa Teresa Project Bowl - Jar Counts . . . D-1
Appendix E - Artifact Frequency Data Used to Construct Artifact Distribution Symaps for the Santa Teresa Study Area E-1

REFERENCES R-1

FIGURES

Figure

1.1 Map of south-central New Mexico and western Texas 2

1.2 BLM land parcels, Strauss, New Mexico quadrangle. 3

2.1 Map of project area showing major geomorphic features 8

2.2 Schematic cross section of project area 9

2.3 Map of geological zones and subzones used in stratification of the sample 12

2.4 Map of project area showing geological zones overlaid on a contour plot of artifact density 21

5.1 Map illustrating grid system 56

5.2 Transect survey form 58

5.3 Transect grid unit recording form. 60

5.4 Site 54 62

5.5 Recording and collecting Site 46 62

6.1 Project area survyed by the Density-Dependent and traditional methods 66

6.2 Distribution of sites within the project area. 72

6.3. Composite J-score by assemblage size 88

6.4. Ground stone artifacts plotted by composite J-score. 90

6.5. Chipped stone artifacts plotted by composite J-score 91

7.1 El Paso preliminary sort recording form 94

7.2 Santa Teresa Project: Material type codes 100

TABLE OF CONTENTS (continued)

FIGURES (continued)

Figure **Page**

7.3 Material type groupings for Santa Teresa data presentation . . . 104

7.4 Relationsip of raw material diversity to artifact frequency 114

7.5 Santa Teresa Project lithic tool class coding sheet. 119

7.6 Cobble manos, plan view and cross section. 126

7.7 One-hand manos 128

7.8 Slab metate, obverse and reverse views 129

7.9 Trough metate 130

7.10 Large pestle 132

7.11 Pounding implements and composite core tools 134

7.12 Pallettes 135

7.13 Concave-convex manos, plan views and cross section 136

7.14 Other ground stone artifacts 137

7.15 Bifacial cores, obverse and reverse views 138

7.16 Multidirectional and unidirectional cores 139

7.17 Stage bifaces 147

7.18 Large scrapers 147

7.19 Other scraper forms 148

7.20 Knives 148

7.21 Denticulates and composite flake tools 149

7.22 Augustin 159

7.23 Chiricahua 159

7.24 Pelona 162

7.25 Shumla 164

7.26 Beckett Type 6 165

TABLE OF CONTENTS (continued)

FIGURES (continued)

Figure **Page**

7.27 San Pedro 166

7.28 Small side-notched 168

7.29 Maljamar 169

7.30 Beckett Type 9 171

7.31 Beckett Type 10 174

7.32 Oshara types. 179

7.33 Miscellaneous types 180

7.34 Unidentified types 182

7.35 Unidentified types 184

7.36 Unidentified types 186

7.37 Unidentified types 189

8.1 El Paso Brown jar rims 194

8.2 El Paso Brown bowl rims 195

8.3 Jornada Brown rim forms 196

8.4 El Paso Black-on-Brown jar rims 198

8.5 El Paso Black-on-Brown bowl rims 199

8.6 El Paso Red-on-Brown bowl and jar rims 200

8.7 El Paso Polychrome rim forms 201

10.1 Distribution of historic artifacts within the project area . . . 215

10.2 Maker marks with accompanying user marks 220

10.3 User marks 226

10.4 Variations of the Onondaga basemark 227

10.5 Caliber and headstamps 230

10.6 Shogun shell headstamps 232

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TABLE OF CONTENTS (continued)

FIGURES (continued)

Figure		Page
10.7	Bullets	232
11.1	Perspective view of the Santa Teresa research area based on a digital elevation model	237
11.2	Perspective view of the Santa Teresa research area based on a digital elevation model	238
11.3	Distribution of all artifacts in the Santa Teresa study area	239
11.4	Distribution of all artifacts in the Santa Teresa study area.	241
11.5	Map of project area, showing geological zones overlaid on a contour plot of artifact density	242
11.6	Mean and standard deviation of View Index for total artifact frequency classes, Santa Teresa study area	244
11.7	1st order trend surface of total artifact frequency in the Santa Teresa study area	246
11.8	Distribution of ceramic artifacts in the Santa Teresa study area.	247
11.9	Distribution of ground stone artifacts in the Santa Teresa study area	248
11.10	Distribution of fire-cracked rock in the Santa Teresa study area	249
11.11	Distribution of chipped stone artifacts in the Santa Teresa study area	250
11.12	Distribution of hearth features in the Santa Teresa study area	251
12.1	Distribution of sites with Archaic period components in the Santa Teresa study area	257
12.2	Distribution of sites with Mesilla phase components in the Santa Teresa study area	258
12.3	Distribution of sites with El Paso phase components in the Santa Teresa study area	259
12.4	Distribution of sites with mixed ceramic components in the Santa Teresa study area	260

TABLE OF CONTENTS (continued)

FIGURES (continued)

Figure Page

12.5 Distribution of Sites of Unknown Age in the Santa Teresa study area 261

TABLES

Table

3.1 Development sequence of the Jornada Mogollon 26

3.2 El Paso phase intrusive ceramics 29

3.3 Previous archaeological work within the study area 35

3.4 Inventory of cultural resources in study area 36

6.1 Descriptions of Santa Teresa sites 68

6.2 Description of isolated manifestations 74

6.3 Temporarilly sensitive point types 78

6.4 Distribution of temporal components 79

6.5 Obsidian hydration calendar date 80

6.6 Obsidian hydration rates, rims, and source affinity 80

6.7 Radiocarbon dates 81

6.8 Comparison of relative and absolute dating methods 82

6.9 Artifact categories employed in analysis 84

6.10 Example, J-scores for LA 49317 85

6.11 Composites and J-scores by artifact classes by site 86

7.1 Material by site 108

7.2 Material groupings used to approximate Carmichael's material varieties 115

7.3 Basic statistical data for the temporal groups used in the two Santa Teresa Lithic Diversity Index studies 116

7.4 Implement category by site 121

TABLE OF CONTENTS (continued)

TABLES (concluded)

Table **Page**

7.5 Tools by site 143

7.6 Metric data for projectile points from the Santa Teresa survey 155

8.1 Worked sherds from the Santa Teresa Project survey area 202

9.1 Sizes of flotation samples and processed fractions 205

9.2 Wood charcoal recovered from flotation samples 207

9.3 Seeds recovered from flotation samples 208

10.1 Military cartridge cases 214

10.2 Distribution of glass colors by bottle type 216

10.3 Summary of bottles collected on the Santa Teresa Project and the probable dates of manufacture 224

10.4 Basemarks and design patterns 228

10.5 Manufacturer and probable date of manufacture of shells collected on the Santa Teresa Project 233

Chapter 1

THE SANTA TERESA PROJECT

John C. Ravesloot

This report summarizes the inventory, evaluation, and data recovery of the cultural resources in a portion of the Santa Teresa land parcels that are proposed for exchange as part of the Navajo-Hopi relocation project. The Santa Teresa study area is located in south-central New Mexico west of the Rio Grande River within the Mesilla Bolson. This area, as defined by the Bureau of Land Management (BLM), is bounded by the East Potrillo Mountains on the west, the Southern Pacific Railroad on the north and east, and the International Border on the south (Fig. 1.1). The BLM has identified 10 parcels of public land within the study area that have been selected for disposal, as authorized by the Navajo-Hopi Relocation Amendments Act of 1980 (P.L. 96-305) and the Federal Land Policy and Management Act. These parcels, which are referred to as the survey area, comprise roughly 5640 acres located in T28S R3E, Section 31; T29S R3E, Sections 5, 6, 7, 8, 17, and 18; and T29S R2E, Sections 1, 12, and 13. These sections are shown on the Strauss, New Mexico-Texas 7.5-minute U.S.G.S. quadrangle map (Fig. 1.2).

The cultural resource inventory was conducted from September 2 to 29, 1984 by personnel from the Arizona State Museum (ASM) and the Desert Research Institute (DRI) under contract number YA-551-CT4-340012. Inventory and data recovery of the cultural resources within these parcels followed, with modifications, the field strategy outlined in the comprehensive plan prepared by ASM and DRI (Irwin-Williams and others 1984b). A two-phase field strategy was proposed and implemented. The first phase of the project included an instrument survey, inventory and data recovery of 3 percent of each major geomorphological zone using a modified version of the Density-Dependent Method (Irwin-Williams and others 1981) with a traditional record of sites, isolated manifestations, and isolated artifacts. During this phase, all artifactual material observed within each 100-square-meter transect unit was mapped and collected. An additional 50 percent of each geomorphological zone was surveyed during the second phase of the project using traditional resource definition, with collection being limited to sites and isolated diagnostic artifacts. Artifact counts were also made for many of the 100-square-meter units, which enabled a quantitative analysis of approximately 87 percent of the survey area.

The Density-Dependent Method has been previously employed by Irwin-Williams in the study of Archaic populations in the Arroyo Cuervo region of northwestern New Mexico. This survey and data recovery methodology was developed to resolve the problem of dealing with surface artifact scatters, particularly Archaic ones, that represent the remains of specialized activities such as hunting and gathering but fall below the minimum definition of a site. It provides a means for making

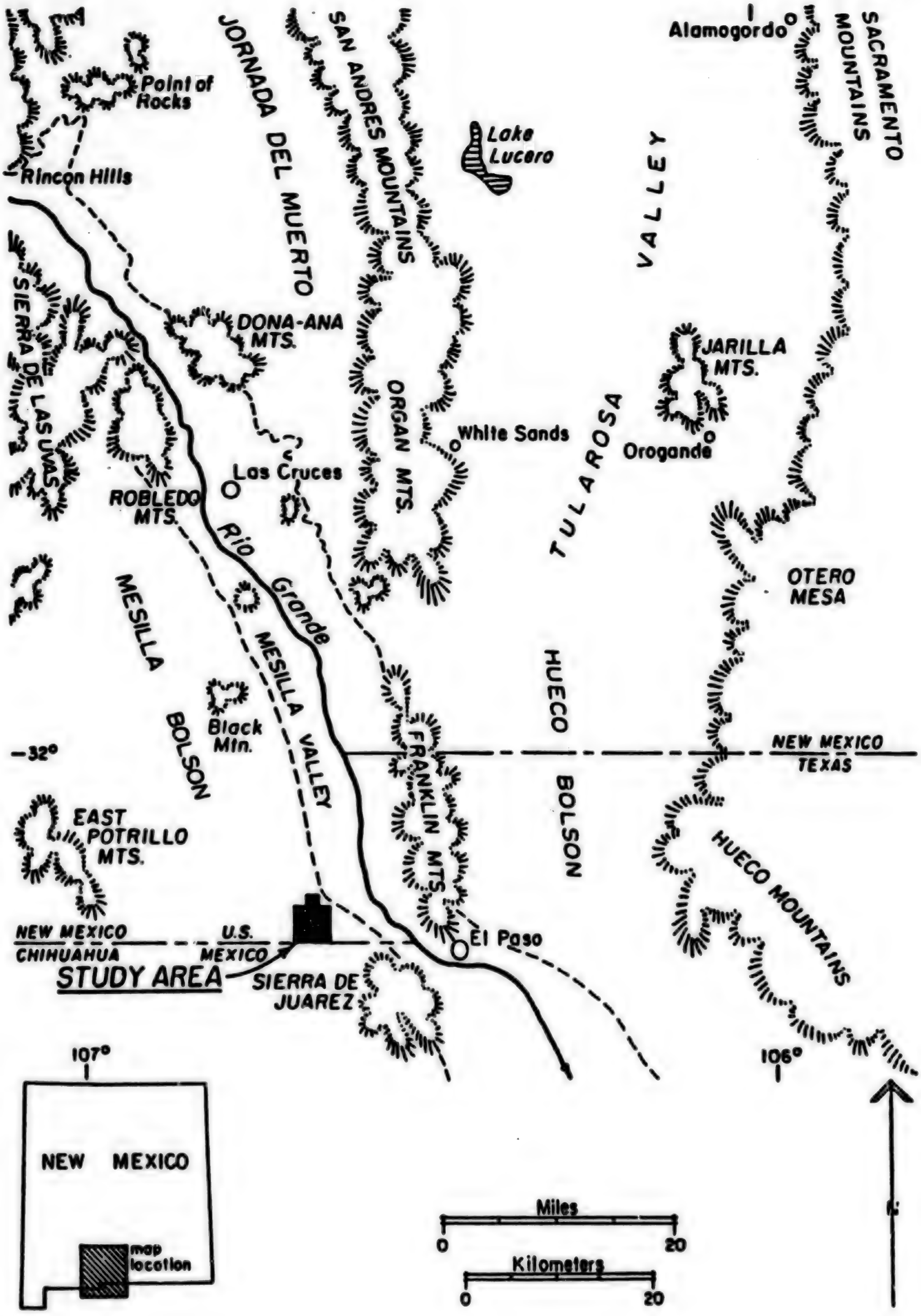

Figure 1.1. Map of south-central New Mexico and western Texas.

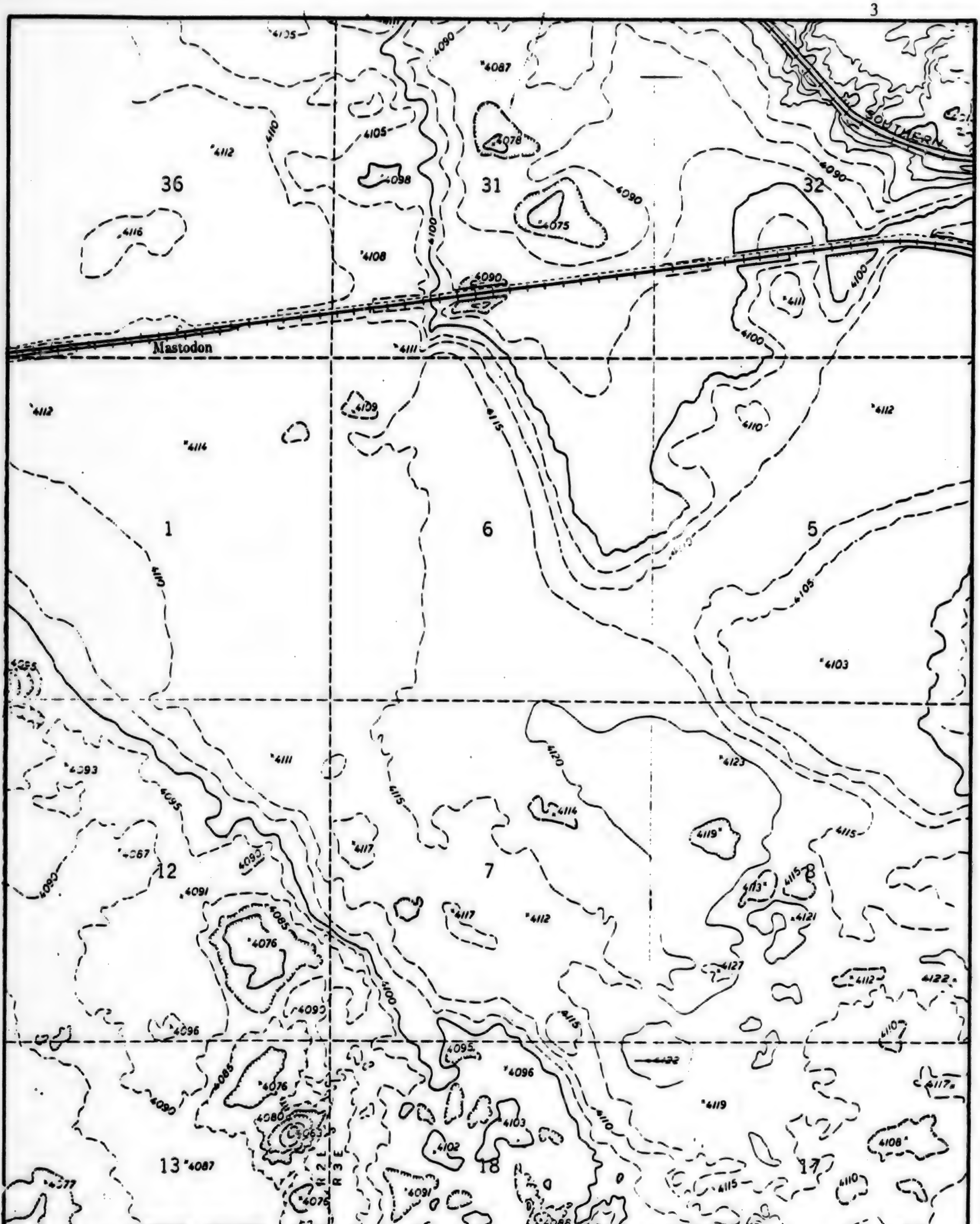

Figure 1.2. BLM land parcels, Strauss, New Mexico quadrangle.

comparisons between surface concentrations of artifacts that vary in size, density, and function.

A review of the existing archaeological literature and a preliminary field reconnaissance of the Santa Teresa survey area indicated that cultural resources encountered in the project area would be predominately represented by surface sherd and lithic scatters, presumably the remains of specialized activities such as food procurement and processing. It was argued that the information potential of this class of resource could be completely mitigated using the Density-Dependent Method, since resources within the study area were, for the most part, completely deflated. In addition, it was felt that the BLM Santa Teresa Project represented a unique opportunity to evaluate the use of a modified version of the Density-Dependent Method within a cultural resource management context.

Field reconnaissance resulted in the identification and surface collection of 68 archaeological "sites." All the "sites" were completely deflated down to the Pleistocene Paleosol. These sites were presumed to represent the remains of activities related to prehistoric resource processing and procurement. They consisted of ceramic or chipped stone scatters, or both, which occasionally contained hearths of fire-cracked rock and burned caliche. In addition, 198 isolated manifestations (IMs), that is, low density but discrete artifact scatters, and hundreds of isolated artifacts (IAs) were recorded and collected. Review of the archaeological resources identified in the Santa Teresa parcels suggest an occupation of the study area from Paleo-Indian to modern times.

It is believed that the information potential of the cultural resources of the Santa Teresa study area has been adequately realized through the survey and data recovery strategy implemented. Therefore, the ASM recommends archaeological clearance for the 5640 acres scheduled for exchange.

Project Organization and History

The BLM is required by law to comply with regulations dealing with cultural resources as defined by the 1966 Historic Preservation Act, and subsequent regulations, before disposing of any public land. The BLM developed a set of procedures to guide work conducted under contract number YA-551-CT4-340012 in order to standardize the cultural resource compliance process for proposed land disposals. The first task in the process consisted of preparing a comprehensive plan that would be used to guide the identification, evaluation, and treatment of cultural properties within the study area. The area covered by this study area, which formed the basis of the comprehensive plan, was defined by the BLM along cultural and geographical boundaries. The comprehensive plan was required to include an overview of the study area, an implementation plan, a schedule for inventory and a preliminary report upon completion. Specific guidelines concerning the preparation of overviews and appropriate inventory strategies were provided by the BLM.

During the week of July 16, 1984 a preliminary field reconnaissance of the actual survey area was conducted by Lynn S. Teague and Fred Nials of the ASM and Cynthia Irwin-Williams, Jonathon Davis, and Patrick Beckett of the DRI. A literature search was also initiated at this time. On July 23, 1984 a preliminary outline of the methodology formulated for inventory and data recovery of the Santa Teresa cultural resources was presented to Thomas W. Merlan, New Mexico Historic Preservation Officer (SHPO), in Roswell, New Mexico by Cynthia Irwin-Williams. The proposed survey and data recovery methodology was tentatively approved by the New Mexico SHPO at that time.

On the basis of the literature search and field reconnaissance, a comprehensive plan for the study area was prepared by the ASM and the DRI over a three week period in July and August (Irwin-Williams and others 1984b). This plan provided a discussion of the environment and a summary of culture history and previous research, identified important research questions and gaps in our understanding of the archaeological and historical record, prepared an inventory of cultural resources previously identified within the study area, and presented an implementation plan for the evaluation of the survey area. A draft copy of this plan was sent for review and comments to John Hanson, Contracting Officers Authorized Representative (COAR), Chris Kincaid (New Mexico State BLM archaeologist), and the New Mexico State Historic Preservation Office.

The field phase of the project was scheduled to begin on August 27 following BLM authorization on August 10. Because the authorization was received four weeks late, fieldwork did not begin until September 5.

On September 25, 1984 representatives from the New Mexico State Historic Preservation Office and the BLM met with ASM and DRI personnel in El Paso, Texas to review the results of the initial 10 percent sample of the survey area. The purpose of this consultation, which was scheduled at the request of the New Mexico SHPO, was to determine whether the strategy implemented was adequate to identify all sites potentially eligible for inclusion in the National Register of Historic Places. The survey and data methodology strategy implemented was determined to be adequate. Fieldwork was completed on September 29, 1984. Two hundred ninety-seven person-days were necessary to complete the inventory and data recovery of these resources. A preliminary report summarizing the results of the survey was submitted to the BLM on November 20, 1984 (Ravesloot 1984).

Report Organization

Chapters 2 through 5 of this report provide background information that includes a description of the environment and geomorphology of the survey area, a discussion of previous archaeological and historical research, a definition of research goals, and an outline of the specific inventory and data recovery methodology utilized. Chapters 6 through 10 present a summary of the results of the project. A traditional description (that is, sites, isolated manifestations, and isolated artifacts) of the Santa Teresa archaeological resources is presented in Chapter 6. This chapter also contains a summary of chronological analyses and an analysis of assemblage diversity for each of the defined sites. The remaining chapters in this section of the report present the analyses of specific artifact classes (that is, ceramic, chipped stone, and so forth) that were collected. Finally, Chapters 11 and 12 provide interpretations of the data. These include a quantitative analysis of activity patterning based upon density distributions of artifacts identified from the 100-square-meter unit collecting and recording strategy, and comparisons of the survey results using traditional resource definitions with the adjacent areas such as the Tularosa Basin and the Hueco Bolson. An evaluation of the feasibility and usefulness of the application of the Density-Dependent Method within a cultural resource management context is also presented.

Chapter 2

GEOMORPHOLOGY OF THE STUDY AREA

Jonathan O. Davis and Fred Nials

The Santa Teresa study area occupies an area of dunes on the West Mesa, beginning a fraction of a kilometer from the edge of the Rio Grande (Mesilla) Valley and extending 5 km to the southwest. The area is generally flat but has significant local relief, from a low of 4053 feet (1235 m) in a closed depression in the southwest extremity to a high of 4127 feet (1258 m) on a dune in the southeast. The oldest geologic unit in the study area is the middle Pleistocene Camp Rice Formation, deposited as an alluvial plain of the ancestral Rio Grande river, which underlies the entire project area. No integrated surface drainage exists.

Landforms

The regional landforms of the Santa Teresa area are the West Mesa, a nearly flat-topped relict bolson fill upon which the study area is located, and the Rio Grande valley, locally called the Mesilla Valley. The Rio Grande River lies about 1143 m (3740 feet) above sea level and is entrenched some 100 m (350 feet) into the bolson fill of the West Mesa. This relief is distributed through a slope about 3 km long, which is steep and badlandlike at the top and becomes gentler towards the bottom. The project area itself occupies only the actual top of the West Mesa, but the proximity of the Mesilla Valley and the Rio Grande must be considered in any discussion of cultural resource location in the project area. The large-scale landforms in the study area proper are of low relief and are difficult to distinguish on the ground because of innumerable small dunes superimposed upon them. Figures 2.1 and 2.2 show the features discussed below. A scarp about 15 to 35 feet (5 m to 11 m) high runs from northwest to southeast through Sections 31, 6, 5, and 8 and faces northeast. Another scarp about 20 feet (6 m) high lies parallel to the first but about a mile (1.6 km) to the southwest and faces southwest. The scarps may be fault-line scarps of Pleistocene age, and a dune-covered highland lying between them may be a horst. Two shallow embayments extend from the west slope of the Mesilla Valley into the study area in Sections 31, 5, 6, and 8. The embayments may be relict Pleistocene drainages, flooded with Holocene sand; there is no channel network in them now. Lying just to the east of the horst and in the embayment in Section 31 are several closen depressions that are as much as 25 feet (8 m) deep and a few hundred meters in diameter. Similar, but larger and deeper (to 30 feet [10 m] deep) depressions occur to the west of the horst in Sections 1, 12, 13, and 18. These depressions are either ancient deflation hollows, piping features, or both. They show no evidence of having ever held water, lacking shoreline features or fine-grained sediment.

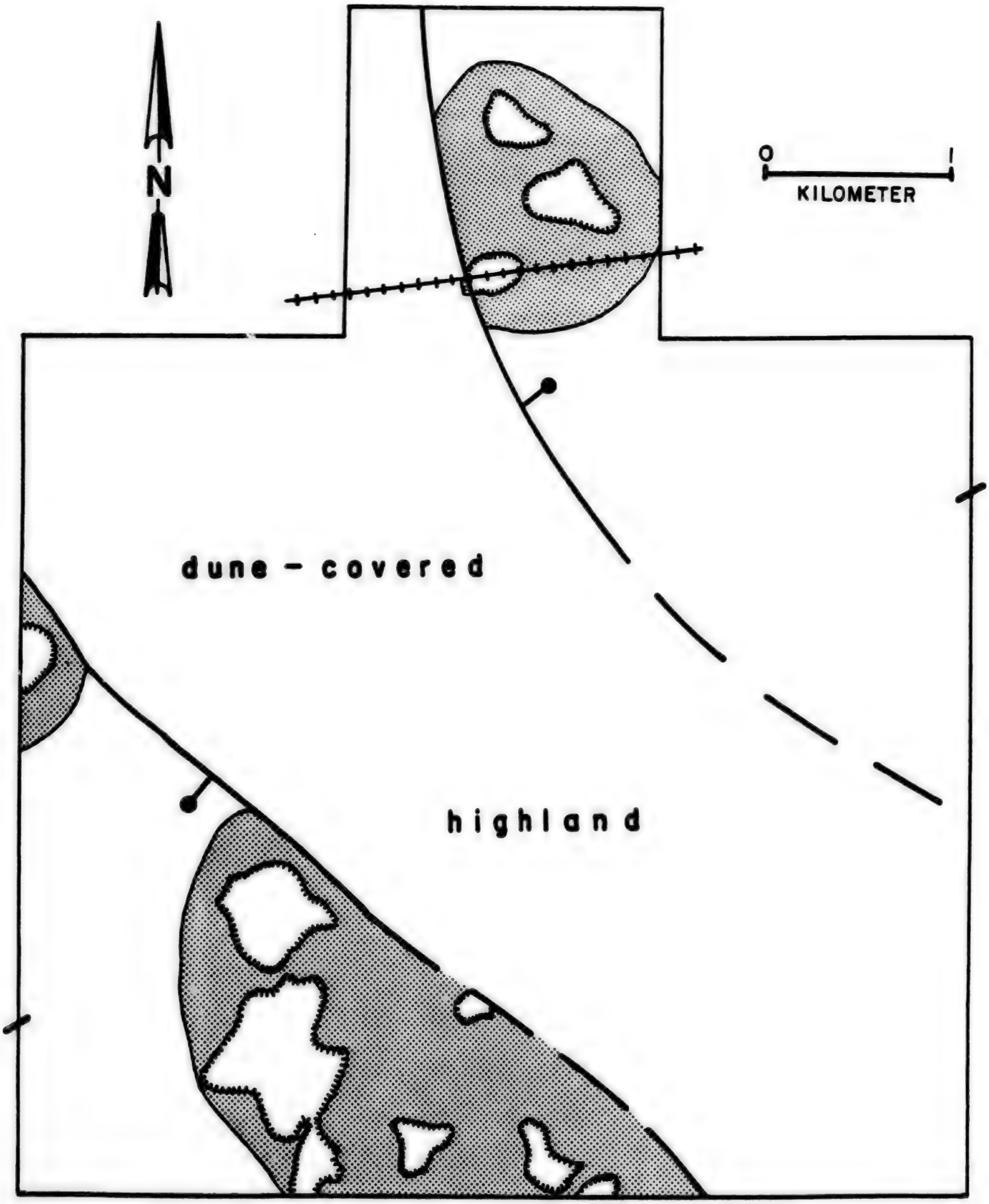

Figure 2.1. Map of project area, showing major geomorphic features. Heavy lines are faults, with balls on downthrown sides. Closed depression areas are shaded, and major individual depressions are shown by hatching. Line A - A' shows location of Figure 2.2.

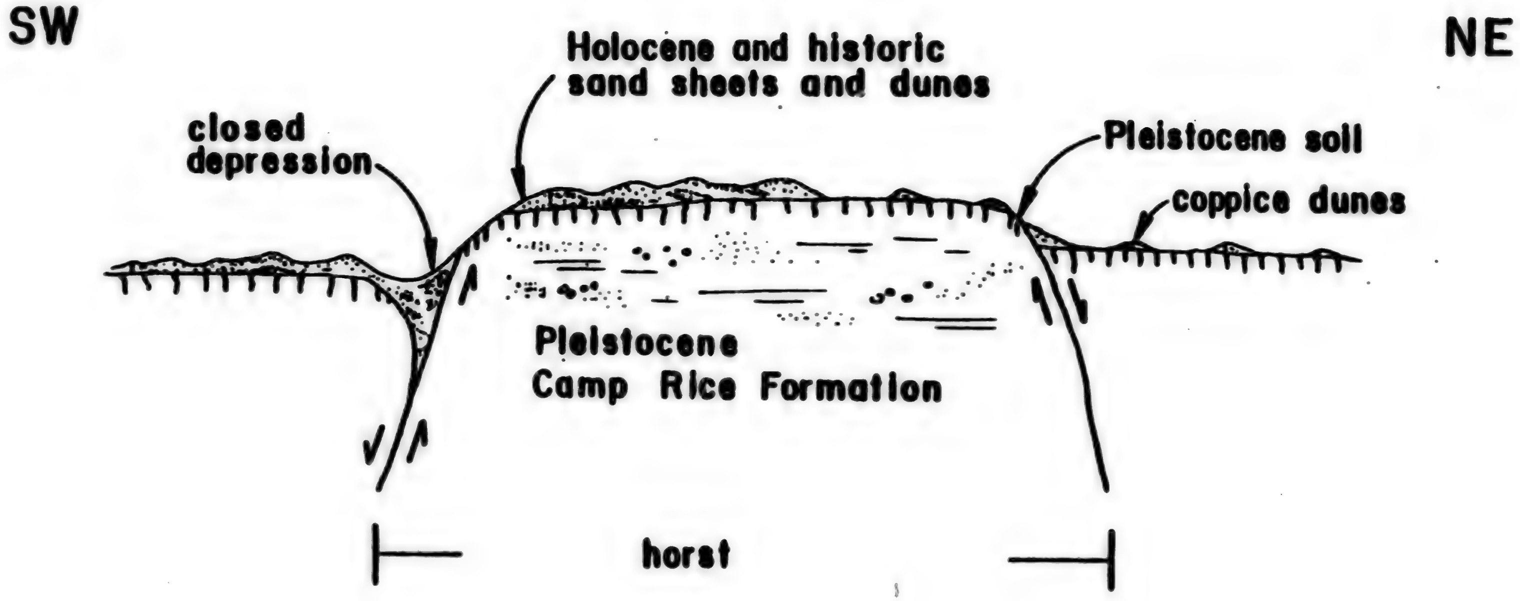
SW
NE
Holocene and historic sand sheets and dunes
closed depression
Pleistocene soil
coppice dunes
Pleistocene Camp Rice Formation
horst

Figure 2.2. Schematic cross section of project area, along line A - A' shown in Figure 2.1. Not to scale.

Stratigraphy

Exposures along the railroad bed and along the edges of the horst suggest that these major landforms represent modifications of an intially nearly planar surface (La Mesa surface, Gile and others 1981: 38-39), formed before the entrenchment of the the Rio Grande River. This relict Pleistocene surface bears a compound soil profile (Gile and others 1981: 112-114) characterized by multiple reddened B horizons and petrocalcic horizons that erode into hard nodules of caliche, which remain as a lag when the soil is deflated. Concentrations of these nodules together with pebble gravel lying on the surface along each side of the horst suggest that the scarps truncate the Pleistocene soil. Caliche nodules at the surface in some of the depressions suggest that the depressions, like the scarps, penetrate and therefore postdate the Pleistocene soil.

Draped over these major landforms in the Santa Tereas study area are sand dunes and sand sheets, which together with blowouts cut through the sand; they comprise the small-scale landforms and Holocene sediments of the area. No detailed study of the stratigraphy of these sediments was undertaken; however, in a few places, buried soil profiles representing the 700-year-old "Puebloan" A horizon and the 4000- to 6000-year-old Altithermal soil were observed. This implies that the Holocene sand comprises at least three stratigraphic units: one older than 6000 years, one 700 to 4000 years old, and one younger than 700 years. Of these, only the youngest is well exposed; indeed it covers most of the project area and its distribution is the major determining factor in the distribution of cultural resources. Gile and others (1981: 112-125) describe the stratigraphy and soil profiles of an area to the north, which is quite similar to the Santa Teresa study area.

Procedures

A preliminary inspection of the study area was undertaken by Fred Nials and Jonathan Davis during the week of July 16 to 20, 1984, using the published topographic map, a black and white (nonstereoscopic) aerial photograph, a color stereoscopic pair of aerial photographs, and on-ground observations of the more accessible parts of the area. On the basis of this inspection, the area was broken into strata for archaeological sampling. In defining the strata, major attention was paid to characteristics important to cultural resource management; namely, if archaeological remains are present, will they be visible, will they be stratified, and what age will they be. To a large degree, the aspects of visibility and stratification are mutually exclusive; remains that are visible on the surface of the ground are usually out of stratigraphic context, and remains found in stratigraphic contexts are usually buried and therefore invisible (these generalities may not apply to other sorts of areas, for instance, an area traversed by arroyos may preserve visible stratified remains).

After the stratification scheme had been devised and substantial archaeological fieldwork accomplished, Davis returned to the study area during September 17 to 20, 1984. The less accessible parts of the study area were then examined on foot and by off-road vehicle, and several discovered archaeological sites were examined and assessed. Only much enlarged, nonstereoscopic black and white aerial photos were available in September. No major revision of the stratification was proposed at this time, although parts of Sections 7 and 31 were reclassified.

Stratification Scheme

The Santa Teresa study area was divided into three major zones: Zone 1 is characterized by coppice dunes stabilized by Prosopis, mesquite which are usually lying upon a deflated surface armored by pebbles; Zone 2 is characterized by flat-lying surficial sand with little relief; and Zone 3 is characterized by parabolic dunes with or without intervening blowouts, dominated by yucca. Zones 1 and 3 account for almost all of the area, with Zone 2 being limited to parts of Sections 1 and 7 (see Fig. 1.2). The archaeological expectations associated with the zones were as follows: In Zone 1, archaeological visibility is good in the interdune areas, because all of the artifact scatters have been deflated (or never were buried) and lie exposed as particles in the lag gravel, spatial context for these artifacts may be moderately well preserved, however, stratigraphic context for such specimens is nearly nil. In Zone 2, visibility of archaeological remains is essentially nil, because prehistoric remains are (and remain) buried by the sand, but if such buried remains were somehow found, their spatial and stratigraphic context would be well preserved. In Zone 3, visibility is nearly as poor as in Zone 2, but some subzones of Zone 3 include blowouts in which visibility is improved. In general, Zone 1 is the area of high archaeological visibility and concomitantly poor contextual preservation, whereas Zones 2 and 3 are the areas of poor visibility but better potential contextual preservation.

Although it is known that the modern sand dunes and blowouts in the Santa Teresa study area are historic features (Gile and others 1981: 115), we did observe soil profiles in several places that indicate older sand layers are present beneath the modern sand of Units 2 and 3. It is likely that artifacts and other cultural remains may be buried in these older sands. The high concentration of cultural remains found in Unit 1 may represent a lag concentrate which has been at various times deposited on sand, deflated, reburied by sand, and so forth. In other words, it is geologically reasonable to suppose that a similar density of artifacts and features lie buried in Units 2 and 3 as lie exposed in Unit 1. Units 2 and 3 thin at the edges somewhat gradually; however, the increase in the density of cultural remains at the edges (but within 2 and 3) might represent the increasing exposure of the buried specimens. Similarly, inclusions of Unit 1 increase in frequency towards the edges of Units 2 and 3.

A tabular breakdown of the zones and subzones for Zones 1 and 3 follows. The approximate boundaries of these zones within the survey area are illustrated in Figure 2.3. Each unit contains local inclusions of other units that cannot be mapped at the scale used here.

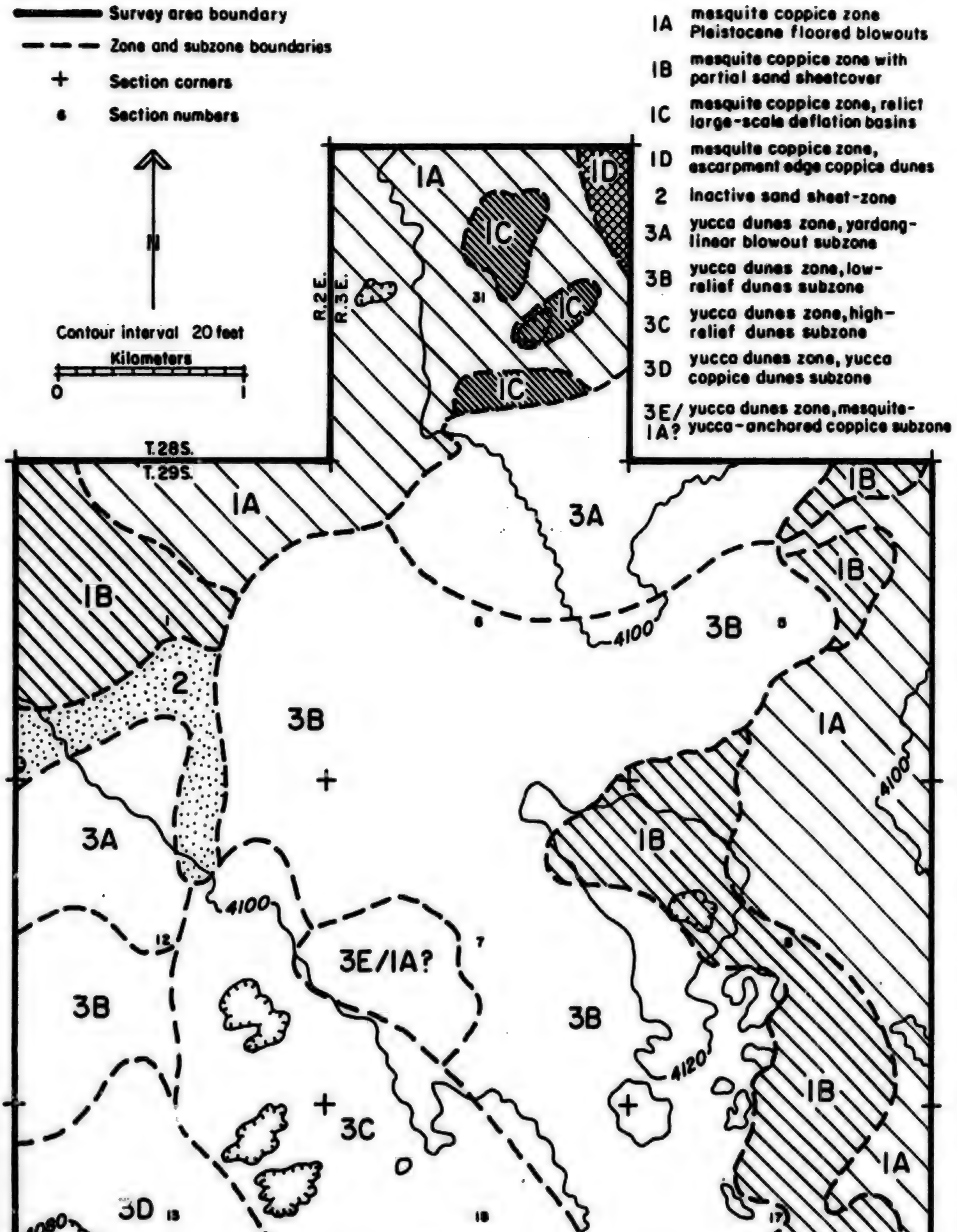
Survey area boundary
Zone and subzone boundaries
+ Section corners
6 Section numbers
N
Contour interval 20 feet
Kilometers
0
1
1A mesquite coppice zone Pleistocene floored blowouts
1B mesquite coppice zone with partial sand sheetcover
1C mesquite coppice zone, relict large-scale deflation basins
1D mesquite coppice zone, escarpment edge coppice dunes
2 inactive sand sheet-zone
3A yucca dunes zone, yardang-linear blowout subzone
3B yucca dunes zone, low-relief dunes subzone
3C yucca dunes zone, high-relief dunes subzone
3D yucca dunes zone, yucca coppice dunes subzone
3E/1A? yucca dunes zone, mesquite-yucca-anchored coppice subzone
R.2E.
R.3E.
T.28S.
T.29S.
31
6
5
1
12
7
8
13
18
17
4100
4120
4080
1A
1B
1C
1D
2
3A
3B
3C
3D
3E/1A?

Figure 2.3. Map of geological zones and subzones used in stratification of the sample.

1A—Mesquite Coppice Zone, Pleistocene-Floored Blowouts

Identifying Characteristic(s): Blowouts at a uniform level, all floored by Pleistocene lag gravels, soil or Pleistocene-Holocene composite soil; some lag concentrate almost always present in floors of blowouts, mesquite-anchored coppice accumulations of modern origin.

Dominant or Diagnostic Vegetation: Mesquite.

Modern Sand Cover: 25 to 60 percent.

Present Local Relief: 2 m to 5 m.

Dominant Landform(s): Mesquite-anchored coppice accumulations.

Substrate (soil, gravel, and so forth): Noncoppice areas are Pleistocene sediments, Pleistocene soil, Pleistocene-Holocene composite, soil, indurated caliche locally present in vicinity of major depressions, lag concentrates typically contain indurated caliche pebbles.

Sand Activity (stability, supply): Relatively limited sand supply, coppice accumulations are modern and temporary.

Soil Stratigraphy: Multiple buried soils are probably not present in this area. Pleistocene or Pleistocene-Holocene soils in blowouts all formed from the same surface or have been deflated; coppice accumulations are too young to have soil development.

Prehistoric Topography: All available evidence suggests that this subzone was relatively smooth, with little relief except in the area of major deflation basins.

Archaeological Visibility: Any archaeological manifestations in this subzone should be highly visible, although a portion of it is covered by modern coppice accumulations (25 to 60 percent).

Potential Site Integrity: The potential for stratified sites and sites that have not been somewhat affected by eolian activity is virtually nil.

Basis for This Evaluation: Because of ease of access, the northern segment of this subzone was examined as thoroughly as any of the zones or subzones. That portion along the eastern boundary was not examined in the field.

Comments and Recommendations: Extensive excavation should not be considered in any potential mitigation efforts. Some sand cover in the vicinity of coppice accumulations and intervening areas is thin and highly mobile. Because of the transitory nature of this sand, artifact visibility will vary from season to season. Substantial inclusions of Subzone 1B may be locally present.

1B--Mesquite Coppice Zone, Partial Sand Sheet Cover

Identifying Characteristic(s): Low relief, mesquite-anchored coppice accumulations, a large portion of the area between coppice accumulations is covered by a sand sheet approximately 0.5 m to 1.0 m in thickness. Blowouts through the sand sheet typically expose Pleistocene sediments or soil and contain lag gravel concentrates.

Dominant or Diagnostic Vegetation: The dominant vegetation is an unidentified upright forb averaging approximately 20 cm to 30 cm in height. Mesquite is also abundant.

Modern Sand Cover: 30 to 50 percent plus.

Present Local Relief: 1 m to 2 m in most areas.

Dominant Landform(s): Partially eroded sand sheet, mesquite-anchored coppice accumulations.

Substrate (soil, gravel, and so forth): Pleistocene sediments or soil in blowouts, lag gravel concentrate, sand sheet of relatively modern age.

Sand Activity (stability, supply): Although large supplies of sand are present, the sand sheet appears to be relatively stable, consequently coppice accumulations tend to be relatively small.

Soil Stratigraphy: No soil stratigraphy is present that is useful for archaeological purposes. The sand sheet appears to be young enough to cover any but historic archaeological manifestations. Any artifacts present will be observed only in blowouts.

Prehistoric Topography: All available evidence suggests that this subzone was relatively smooth, with little relief.

Archaeological Visibility: Archaeological manifestations can be observed only in the blowout areas. Observed artifact densities were low.

Potential Site Integrity: Poor.

Basis for This Evaluation: Several short transects were walked across this subzone.

Comments and Recommendations: Substantial inclusions of Subzone 1A and Zone 2 may be locally present. Boundaries between Subzones 1A, 1B, and Zone 2 will be gradational and difficult to locate precisely in the field.

1C--Mesquite Coppice Zone, Relict Large-Scale Deflation Basins

Identifying Characteristic(s): Depressions 0.5 km or larger in maximum dimension, with the deepest portions up to 10 m lower than surrounding areas. Other characteristics similar to Subzone 1A.

Dominant or Diagnostic Vegetation: Mesquite, Dalea.

Modern Sand Cover: Similar to Subzone 1A.

Present Local Relief: 1 m to 3 m.

Dominant Landform(s): Coppice accumulations anchored by mesquite or Dalea.

Substrate (soil, gravel, and so forth): Pleistocene sediments or soil, lag gravel concentrates, localized outcrops of indurated caliche, thin accumulations of modern sand in vicinity of some coppice accumulations.

Sand Activity (stability, supply): Available sand supply limited, coppice accumulations are mainly modern and temporary.

Soil Stratigraphy: Multiple buried soils are probably not present in this subzone. Pleistocene soil in blowouts formed on relict surface is typically deflated; coppice accumulations are too young to have soil development.

Prehistoric Topography: Broad, smooth depression.

Archaeological Visibility: Visibility of archaeological materials is very good except where locally covered by coppice accumulations or thin accumulations of modern sand.

Potential Site Integrity: Poor.

Basis for This Evaluation: On-ground observations.

Comments and Recommendations: Extensive excavation should not be considered in any potential mitigation efforts. Some sand cover in the vicinity of coppice accumulations is thin and highly mobile. Because of the transitory nature of this sand, artifact visibility will vary markedly from season to season. Substantial inclusions of Subzone 1B may be locally present.

1D--Mesquite Coppice Zone, Escarpment Edge Coppice Dunes

Identifying Characteristic(s): Proximity to escarpment east of the study area.

Dominant or Diagnostic Vegetation: Mesquite, Dalea, occasional Larrea.

Modern Sand Cover: 60 to 80 percent.

Present Local Relief: 1 m to 3 m.

Dominant Landform(s): Mesquite-anchored coppice accumulations, coalescing to form linear dunes.

Substrate (soil, gravel, and so forth): Lag gravel concentrate in some blowouts, and mainly modern sand accumulations in all other areas. Sediments-soil beneath the modern sand cover are highly calcareous.

Sand Activity (stability, supply): This subzone appears to be the trailing edge of a large, active sand sheet moving across a relict Pleistocene surface in which large supplies of sand are available for transport. Most sand accumulations appear to be relatively thin, covering highly calcareous sediment-soil.

Soil Stratigraphy: Most exposures appear to be modern, with the exception of some blowouts that expose Pleistocene sediments or soil. There is a possibility that the "Puebloan" soil may be locally preserved.

Prehistoric Topography: Probably similar to that of today.

Archaeological Visibility: Probably moderate to poor.

Potential Site Integrity: Probably poor.

Basis for This Evaluation: Interpretation of photos, observations from moving vehicle, on-ground observations.

Comments and Recommendations: There are at least 2 m of relief on the buried Pleistocene surface, and caliche lag nodules are more abundant where the Pleistocene is higher.

2--Inactive Sand Sheet Zone

Identifying Characteristic(s): Broad expanse of smooth sand sheet, almost total absence of blowouts, coppice accumulations, other dune forms, and mesquite.

Dominant or Diagnostic Vegetation: The dominant vegetation is a yet-unidentified upright forb averaging approximately 20 cm to 30 cm in height.

Modern Sand Cover: Virtually total.

Present Local Relief: Less than 30 cm in most locations.

Dominant Landform(s): Relatively smooth sand sheet.

Substrate (soil, gravel, and so forth): Modern eolian sand. Very occasional and localized blowouts might expose Pleistocene sediments-soil, but these probably constitute less than 2 percent of the entire zone.

Sand Activity (stability, supply): This sand sheet appears to be very stable at the present time.

Soil Stratigraphy: Modern sand 0.75 m to 1.0 m thick overlying Pleistocene sediments-soil.

Prehistoric Topography: Appears to have been a smooth, uninterrupted surface dating to the Pleistocene.

Archaeological Visibility: Virtually nonexistent.

Potential Site Integrity: Although some artifacts may be present beneath the sand cover, site integrity would be poor.

Basis for This Evaluation: On-ground observations.

Comments and Recommendations: Minimal expenditure of time and effort should be spent on this zone because geological conditions virtually preclude finding any archaeological manifestations other than historic.

3A--Parabolic Dunes Zone, Yardang-Linear Blowout Subzone

Identifying Characteristic(s): Extremely unstable character of the sand, elongate blowouts, localized small parabolic dunes, very limited mesquite, abundant yucca.

Dominant or Diagnostic Vegetation: Markedly dominated by yucca. Spectacle-pod clematis(?), Baileya.

Modern Sand Cover: 90 percent plus.

Present Local Relief: 1 m to 2 m.

Dominant Landform(s): Yardangs, other elongate blowouts, small parabolic dunes.

Substrate (soil, gravel, and so forth): Eolian sand, occasional limited exposures of the "Puebloan" and mid-Holocene soils, very occasional and limited Pleistocene sediment-soil exposures (characterized by lag gravel concentrates) in deepest blowouts near boundaries with other zones.

Sand Activity (stability, supply): This area is extremely unstable, with large supplies of sand supplied from modern blowouts.

Soil Stratigraphy: "Puebloan" soil (A-horizon only), mid-Holocene soil (Color B-horizon only), Pleistocene sediments-soil locally present near boundaries with other zones.

Prehistoric Topography: Dunal topography having a relief similar to that of today.

Archaeological Visibility: Very poor with the exception of limited areas around the edges of some blowouts. In these localized areas post-Archaic visibility should be moderate.

Potential Site Integrity: The presence of soil stratigraphy indicates the possibility of location of sites retaining some site integrity.

Basis for This Evaluation: On-ground observations; this is the most extensively examined subzone.

Comments and Recommendations: Observed frequency of artifacts is very low. There is some evidence of localized very high velocity winds that have moved pebbles from blowout bottoms several meters horizontally and 0.5 m vertically up onto modern sand deposits.

3B--Parabolic Dunes Zone, Low-Relief Dunes Zone

Identifying Characteristic(s): Modern instability, roughly circular blowouts, heavily dominated by yucca.

Dominant or Diagnostic Vegetation: Yucca.

Modern Sand Cover: 90 percent plus.

Present Local Relief: 2 m to 3 m.

Dominant Landform(s): Roughly circular blowouts, small parabolic dune accumulations.

Substrate (soil, gravel, and so forth): Eolian sand, rare lag gravel concentrates near boundaries with other zones.

Sand Activity (stability, supply): Very active area with large supplies of available sand, mainly supplied by local blowouts.

Soil Stratigraphy: Modern sand, "Puebloan" soil (A-horizon only), (Color B-horizon only), rare exposures of Pleistocene sediments-soil.

Prehistoric Topography: Appears to have been very similar to that of today.

Archaeological Visibility: Very poor, with the exception of very localized areas near the edges of some blowouts.

Potential Site Integrity: The presence of soil stratigraphy indicates the possibility of location of sites retaining some site integrity.

Basis for This Evaluation: On-ground observations.

Comments and Recommendations: Observed frequency of artifacts is very low. This subzone is bounded on the east by the edge of the active sand sheet and on the west by the northwest-southeast trending escarpment visible on topographic maps.

3C--Parabolic Dunes Zone, High-Relief Dunes Subzone

Identifying Characteristic(s): Subzone 3B characteristics draped over relict Pleistocene(?) deflation basins 10 m to 15 m lower than surrounding areas.

Dominant or Diagnostic Vegetation: Similar to Subzone 3B.

Modern Sand Cover: In excess of 80 percent.

Present Local Relief: 2 m to 3 m, except in areas of deeper deflation basins which have relief of 10 m to 15 m.

Dominant Landform(s): Relict deflation basins.

Substrate (soil, gravel, and so forth): Similar to Subzone 3B.

Sand Activity (stability, supply): Similar to Subzone 3B.

Soil Stratigraphy: Modern sand, "Puebloan" soil, Pleistocene sediments are locally exposed on northeast sides of major depressions.

Prehistoric Topography: Believed to be roughly similar to that of today.

Archaeological Visibility: Similar to that of Subzone 3B. Local informant reported that sites are present near the southeast portion of this subzone.

Potential Site Integrity: Similar to that of Subzone 3B.

Basis for This Evaluation: This evaluation is based on analysis of topographic maps, interpretation of photos, and on-ground observations.

Comments and Recommendations: The eastern boundary of this zone appears to be the northwest-southeast trending escarpment visible on topographic maps.

3D--Parabolic Dunes Zone, Yucca Coppice Dunes Subzone

Identifying Characteristic(s): Abundance of yucca-anchored coppice accumulations, and bunchgrass.

Dominant or Diagnostic Vegetation: Yucca, bunchgrass.

Modern Sand Cover: In excess of 80 percent.

Present Local Relief: 1 m to 2 m.

Dominant Landform(s): Yucca-anchored coppice accumulations(?).

Substrate (soil, gravel, and so forth): Moderately continuous sand sheet of unknown age with superposed coppice accumulations.

Sand Activity (stability, supply): Quite unstable with moderately to large supplies of available sand.

Soil Stratigraphy: Probably similar to Subzones 3B, 3C.

Prehistoric Topography: Similar to that of today.

Archaeological Visibility: Probably poor.

Potential Site Integrity: Probably similar to 3B.

Basis for This Evaluation: This evaluation is based on analysis of topographic maps, interpretation of photos, and on-ground observations.

Conclusions

The results of a archaeological sampling and data recovery strongly support the expectations derived from the geomorphology (Fig. 2.4). Site density and artifact density are much greater in Zone 1 than in Zone 2 or 3, and no stratified prehistoric sites were found although some artifacts conceivably may remain buried below the surface in the study area. However, moderate densities of artifacts do occur in Unit 3b in the SW 1/4 of Section 6, along the east line of Section 7, in the SW 1/4 Section 8, and on the south margin of the study area in Sections 17 and 18. These occurrences lie along the fault scarps shown in Figure 2.2 and probably represent either thinner parts of Unit 3b or inclusions of Unit 1 within Unit 3b.

Because of the archaeological focus of this study, and because no excavations were made, little light has been shed on the depositional history of the study area. However, all of the archaeological and geological observations are consistent with the notion that the sand dunes represent a historic influx of sand which has buried the terrain as it existed about 500 year B.P., and that only in Zone 1 is the prehistoric archaeological record well exposed and available for study.

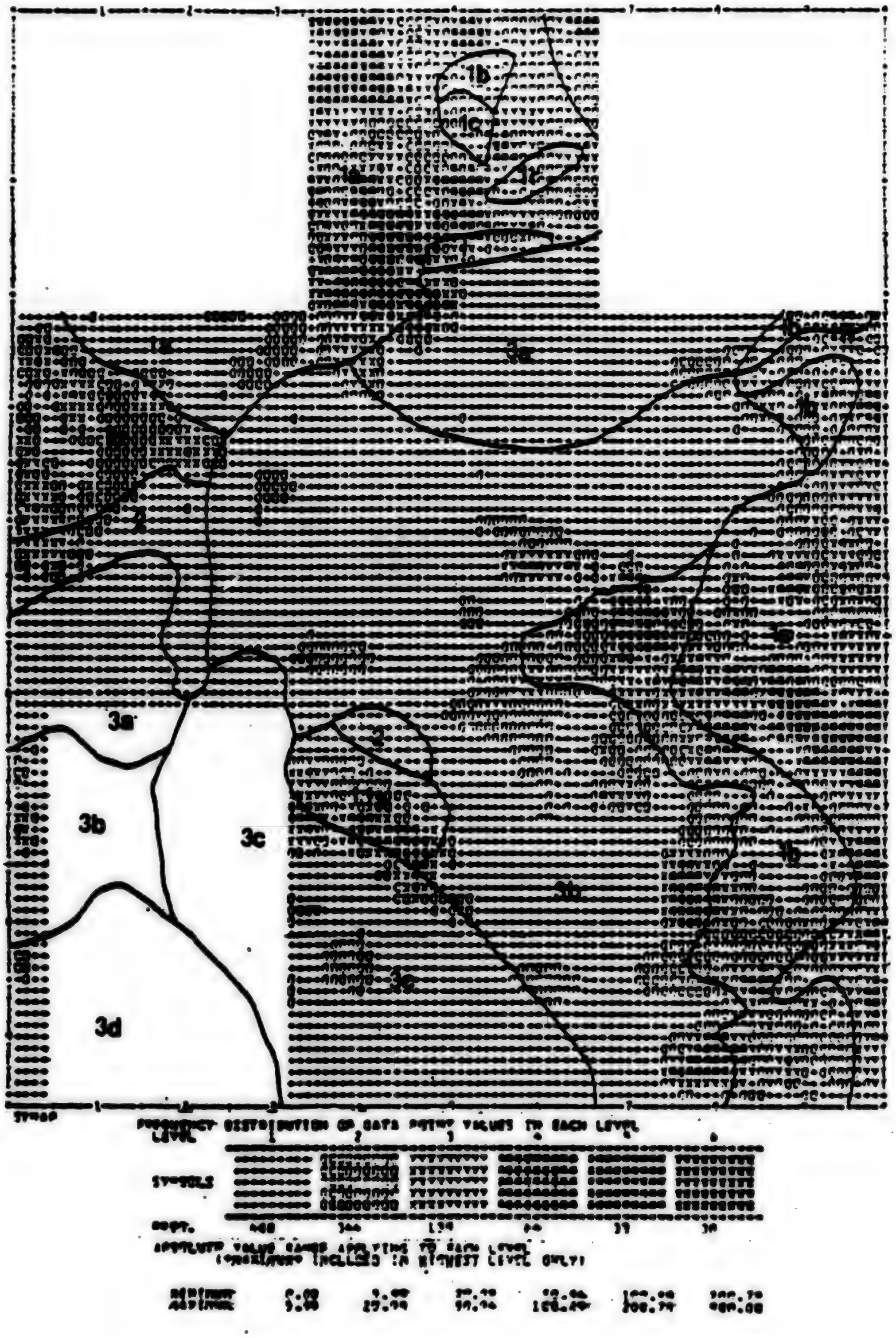

Figure 2.4. Map of project area, showing geological zones overlaid on a contour plot of artifact density.

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Chapter 3

PREHISTORIC PERIOD RESOURCES AND RESEARCH GOALS

John C. Ravesloot

Previous Research

Archaeologically, the Santa Teresa study area falls within the geographic region originally defined as the Jornada Branch of the Mogollon by Lehmer (1948). LeBlanc and Whalen (1980), in their unpublished cultural resources overview of southwestern and south-central New Mexico, have provided an adequate summary of research that had been conducted prior to 1978 within the Jornada Mogollon region. For this reason, a detailed history of archaeological investigations in the region will not be repeated here.

The majority of the archaeological work conducted in the vicinity of the study area has occurred in the last two decades. Inventories of cultural resources on federal lands by the U.S. Army have accounted for most of the work (Beckes and others 1977; Pigott and Dulaney 1977; Whalen 1977, 1978, 1981; Skelton and others 1981; Carmichael 1982a). Several archaeological projects have taken place as a result of the construction of flood control facilities in the El Paso area, particularly the Keystone Dam (O'Laughlin and Greiser 1973; Gerald 1976; O'Laughlin 1980; Fields and Girard 1983). Additional relevant studies in the vicinity include those of Sudar-Murphy and Laumbach (1976), O'Laughlin (1979), Thompson and Beckett (1979), Moore and Bailey (1980), Foster and others (1981), Foster and Bradley (1982), Duran (1982), and Hard (1983). Finally, an archaeological planning document that provided an overview and critique of archaeological research and identified priority areas for future work has been prepared for the State of New Mexico by the State Historic Preservation Office (Stuart and Gauthier 1981).

A brief overview of the region's culture history is presented below. This summary is not intended to be comprehensive because several detailed discussions have been presented elsewhere (Brethauer 1977; Eck 1979; O'Laughlin 1980; Carmichael 1982a). Rather, this discussion provides a chronological framework for viewing the prehistoric cultural development in the vicinity of the Santa Teresa study area. In addition, this discussion emphasizes our current understanding of the adaptive strategies employed by prehistoric populations that inhabited the region and outlines gaps in our knowledge of the region's prehistory. This summary also includes a discussion of specific models that have been developed to explain cultural development and change in the Jornada Mogollon region. Specifically, these models consider the factors responsible for the timing of the pit house to pueblo transition, the evolution of various subsistence and settlement systems, the increase in social complexity during the later pueblo period, and the abandonment of the region.

Culture History

The prehistoric occupation of south-central New Mexico is traditionally discussed in terms of the following developmental periods: Paleo-Indian, Archaic, and Formative. These broad categories are used to organize the following summary of material culture and cultural development in the region.

Paleo-Indian Period

The earliest evidence of human occupation in the vicinity of the Santa Teresa study area dates to what is known as the Paleo-Indian period. This period is characterized by an adaptation to hunting of now extinct big game animals such as mammoth and mastodon. Paleo-Indian sites are identified by distinctive bifacially worked lanceolate projectile point styles, knives, scrapers, and gravers, and date from roughly 11,000 to 8000 years ago (Judge 1973; Cordell 1979). The Paleo-Indian occupation is generally divided into the Clovis, Folsom, and Plano traditions based upon projectile point styles.

Paleo-Indian occupation of the El Paso area is known primarily from the surface discovery of Folsom projectile points and other chipped stone tools in sand dune areas and near dry lake beds (for example Davis 1975; Krone 1975, 1976; Beckes 1977; Whalen 1978; Carmichael 1982a). A recent survey of Army maneuver areas within the southern Tularosa Basin recorded numerous isolated Folsom and Plano points and identified several definite sites (Carmichael 1982a). On the basis of this work Carmichael (1982a) has argued that the area was the scene of a significant Paleo-Indian occupation which has previously gone undocumented because of problems in the recognition of preceramic lithic scatters.

To date, no Paleo-Indian sites have been excavated in the vicinity of the project area. Currently, our most extensive documentation of the occupation of south-central New Mexico comes from the Mockingbird Gap Site (Weber and Agogino 1968) which is located 190 km to the north of the study area and at a site in Rhodes Canyon (Eidenbach and others 1983). Excavations at these sites have yielded Clovis and Folsom points and other Paleo-Indian tool types including end scrapers, side scrapers, gravers, and retouched flakes.

Archaic Period

The Archaic occupation of south-central New Mexico and western Texas was characterized by a broad-spectrum hunting and gathering subsistence base (Beckett 1973, 1983; Irwin-Williams 1979; LeBlanc and Whalen 1980; O'Laughlin 1980). Lehmer (1948: 71-75) originally assigned the Archaic to the Hueco phase on the basis of excavations of dry caves (Sayles 1935; Mera 1938, Cosgrove 1947). The Hueco phase was considered to underlie the later Formative period within the Jornada Branch of the Mogollon. The usefulness of the Hueco phase concept has recently been questioned (Beckett 1979). Beckett (1979: 224) has suggested that the San Andres Mountains may have been a geographic and cultural barrier, with people west of them representing the Cochise tradition, while people to the east had closer ties with unnamed groups to the south and east.

Relatively few Archaic sites have been investigated in the vicinity of the study area. Most of our information comes from surface finds of Archaic style dart points. Fresnal Shelter, situated in the Sacramento Mountains (Human System 1973), and the Keystone Dam sites (O'Laughlin 1980; Fields and Girard 1983) represent two exceptions. Investigations of these sites have revealed that a wide range of plant and animal species were exploited by the Archaic populations. Wild plant foods identified include prickly pear fruits, mesquite pods, Paniceae grasses, juniper berries, bracts of four-wing saltbush, buffalo gourd seeds, stems of Turk's Head cactus, roots of four o'clock, New Mexico feather grass grains, pigweed, dropseed, acorns, cattails, and possibly pinyon nuts (Bohrer 1981). In addition, maize recovered from an Archaic occupation of Fresnal Shelter has been radiocarbon dated to 1510 B.C. (Carmichael 1982b). Mule deer, pronghorn, bighorn sheep, bison, and jack rabbit are the predominate animal species identified from Archaic contexts, although excavation of the Keystone Dam sites indicated that several species of fish (freshwater drum and buffalo) from the Rio Grande River were exploited (Fields and Girard 1983: 209).

A wide range of site types and locations has been defined for Archaic occupations. These include seasonal base camps located along the Rio Grande River and in caves, lithic quarry sites, processing and procurement camps found on the floor of the basins, and agave roasting camps reported for the foothills (Carmichael 1982a: 8-9). O'Laughlin (1980: 24) states that, "Taken together, these sites reflect a general tendency for the movement of social groups to correspond to the seasonal availability and spatial distribution of economically useful plant and animal resources."

Formative Period

The Archaic and Formative period cultures are distinguished by several important elements including the introduction of the bow and arrow, acquisition of ceramic technology, increased importance of cultivated plant foods such as maize and beans, and evidence for increased sedentism as indicated by the construction of pit house villages. These differences were originally viewed as resulting from a change in adaptive strategies from mobile hunting and gathering to a more sedentary lifestyle. It is becoming increasingly evident that the adaptive strategies of the early Formative period and the Archaic were more similar than previously perceived. Recently, it has been suggested that a dual subsistence pattern composed of sedentism and mobility were complementary adaptive strategies for many areas of the Southwest including the Jornada region after A.D. 600 (Upham 1984: 235-256). This proposition will be considered in Chapters 5 and 12.

The Formative period in south-central New Mexico has been the focus of considerably more archaeological research than the preceding Paleo-Indian and Archaic. As the following discussion will make clear, however, there still exist major cultural-historical questions including questions of chronology, which have not been adequately addressed.

Lehmer (1948: 75-88) defined the Jornada Branch of the Mogollon on the basis of variability in architecture and ceramics. The temporal and spatial variability in cultural traits observed in the Jornada area were divided into northern (Tularosa Basin) and southern (Hueco Bolson) variants each of which possessed a three-phase developmental sequence (Table 3.1).

This chronological sequence has been accepted through the years with no radical revisions, although the basis for the dates is far from secure. Marshall (1973) also recognized three phases and described them as ones with pit house villages, pit house villages and surface structures, and villages of surface rooms. Most recently, Whalen (1980) has also accepted the traditional chronology for at least the later phases, although he assigns different names to them: Pit House, Pit House-to-Pueblo, Transitional, and Pueblo. He does, however, extend Lehmer's Mesilla phase back in time some 900 years (defining earlier and later pit house phases) on the basis of several radiocarbon dates, and he divides the El Paso phase into two 100 year intervals. The major distinguishing characteristics of each of these phases are briefly summarized below.

Mesilla Phase (A.D. 200-1100)

The Mesilla phase was defined through excavations at the Los Tules Site (Lehmer 1948: 13-34). Typical of the phase are villages consisting of 2 to 15 pit houses, which are either circular or rectangular in shape. The ceramic assemblage associated with these sites consists almost exclusively of El Paso Brown, although intrusive types include Mimbres Bold Face Black-on-white, Mimbres Classic Black-on-white, Mimbres Corrugated, San Francisco Red, and Alma Plain.

Table 3.1

DEVELOPMENTAL SEQUENCE FOR THE JORNADA MOGOLLON
(After Lehmer 1948)

Northern Variant	Southern Variant	Dates
San Andres	El Paso	A.D. 1200-1400
Three Rivers	Dona Ana	A.D. 1100-1200
Capitan	Mesilla	A.D. 900-1100

Several Mesilla phase settlements have been investigated since this phase was originally defined (for example, Afen 1972; O'Laughlin 1965, 1977a and b, 1981; Whalen 1977, 1978, 1980a; Hard 1983). A considerable amount of information concerning Mesilla phase subsistence and settlement patterns has also become available as a result of large scale surveys and excavations on Fort Bliss in the southern Tularosa Basin and the Hueco Bolson (Carmichael 1981, 1982a; Whalen 1977, 1978, 1981). Whalen's work in the Hueco Bolson has indicated that Mesilla phase settlements were located in a variety of environmental zones (for example High Desert, Middle Desert, and Low Desert). Several different types of sites were defined, primarily on the basis of site size. These include camps, temporary activity sites, and village or residential sites. Survey in the eastern bolson indicated that the majority of sites assigned to this phase were associated with playas in the Low Desert or Middle Desert Zone, presumably to maximize the use of runoff. The analysis of carbonized plant remains from hearths associated with Mesilla phase settlements suggests a subsistence strategy that relied on cultigens as well as wild plant foods. Whalen (1981: 83) also notes that the floor of the Hueco Bolson, while not an optimal agricultural area, did possess the widest range of wild plant species. It is believed that agriculture would have been possible in soils associated with playas, although a subsistence base that relied almost exclusively on cultigens would not have been feasible. Whalen (1983: 5) concludes that "the fact that pithouse period populations were concentrated in this zone suggests greater emphasis on food collection, and less emphasis on food production." Sufficient data exist for the Mesilla phase to suggest a relatively low population density and loosely integrated small social groups (O'Laughlin 1980; Whalen 1981).

Carmichael's (1981, 1982a) recent work in the southern Tularosa Basin largely supports Whalen's (1977, 1978, 1981) model of a dispersed settlement pattern for the Mesilla phase occupation. Nonetheless, Carmichael does isolate several problems with earlier studies of Mesilla phase subsistence and settlement patterns. He (1981: 53-54) states that

> The obvious similarities of Mesilla phase settlement patterns to those of earlier hunter-gatherer groups should have provided important input into previous models of early Formative land use. That this has not been the case is attributable largely to the fact that previous workers in the area have not addressed pre-ceramic settlement patterns (cf. Beckes 1977; Whalen 1977, 1978; Skelton et al n.d.).

Carmichael (1981) argues on the basis of survey data from the southern Tularosa Basin that the pre-Puebloan occupation of the Hueco Bolson and southern Tularosa Basin was largely nonresidential, because the majority of Mesilla phase residential or villages are found outside these two intermontane basins.

Dona Ana Phase (A.D. 1100-1200)

The Dona Ana phase was originally perceived as representing a transitional period between the Mesilla and El Paso phases and was defined on the basis of changes in architectural features and ceramics. Dona Ana phase settlements are described as consisting of pit houses that are associated with contiguous adobe-walled surface structures (Lehmer 1948: 78-80). During this phase, painted ceramics were first made. Indigenous ceramics consisted of El Paso Brown, El Paso Bichrome, and some El Paso Polychrome. In addition, intrusive ceramics identified from Dona Ana settlements suggest a much larger regional interaction system than was present during the Mesilla phase. Intrusive ceramics include Mimbres Classic Black-on-white, Chupadero Black-on-white, Three Rivers Red-on-terracotta, and St. Johns Polychrome.

The Dona Ana phase is not well known because relatively few sites dating between A.D. 1100 and 1200 have been investigated (for example, Kegley 1979; Marshall 1973). Several recent investigators have simply called this period transitional between pit house and pueblo occupation, and there have been no attempts to define Dona Ana phase sites (Skelton and others 1981; Whalen 1977, 1978). Carmichael (1982a: 213) has documented a Dona Ana phase occupation in the southern Tularosa Basin on the basis of Lehmer's (1948) definition. The Dona Ana, or Transitional, period was found to have a distinctive land-use pattern similar to adjacent areas such as the Mimbres.

The ecological, demographic, and organizational aspects of the pit house-to-pueblo transition in south-central New Mexico and western Texas have recently been considered (Whalen 1981: 87-88): ". . . the pit house-to-pueblo transition in the Hueco Bolson consisted of a small-scale, broad-spectrum adaptation giving way to one which was larger in scale, intensive, and more specialized than ever before." Several specific cultural-ecological processes of change believed to have occurred during this transition include an increase in area population, the appearance of larger communities, increasing reliance on cultigens such as corn, system specialization, increasing residential unit size, and more complex ceremonial activities which served to socially integrate populations (Whalen 1981: 88). The basic pueblo way of life was firmly established in the Jornada Mogollon area by A.D. 1200 (LeBlanc and Whalen 1980: 389).

El Paso Phase

The El Paso phase marks the beginning of the Pueblo period in south-central New Mexico and western Texas. This phase succeeds the Dona Ana phase and lasts until around A.D. 1400. The El Paso phase represents the most extensively investigated prehistoric occupation in the El Paso area. Numerous sites of this time period have been tested and partially excavated: La Cabrana Site (Foster and others 1981; Foster and Bradley 1984), the Bradfield Site, Alamogordo Site No. 2 (Lehmer 1948), Twelve Room House Ruin (Moore 1947), the McGregor Site (Brook 1967a), the Sage Site (Brook 1967b), Firecracker Pueblo (Thomas O'Laughlin, personal communication), the Hot Well Site (Davis 1967;

Hedrick 1967; Schultz 1967; Brook 1970) and the Anapra Pueblo (Scarborough 1984). In addition, extensive surveys completed in the vicinity of the study area have documented a wide range of site types (that is, large residential pueblos, small pueblos, specialized procurement camps, lithic quarry sites, and so forth; Beckes 1977; Carmichael 1982a; Whalen 1977, 1978, 1980b, 1981).

The El Paso phase is characterized by small and large contiguous, adobe-walled pueblos which follow one of two plans. Rooms are found to be grouped around plazas or oriented east-west in long tiers (Lehmer 1948; Marshall 1973). El Paso Polychrome is the dominant ceramic type, although a wide range of intrusive wares are recorded, suggesting that an extensive regional interaction network was in operation. Intrusive ceramics indicate interaction with the White Mountain area of Arizona; northern Chihuahua, Mexico; Rio Grande Valley, New Mexico; Mimbres Valley, New Mexico; central New Mexico; and the eastern middle Gila area, Arizona. Table 3.2 lists intrusive ceramic types identified at El Paso phase sites.

Studies of the settlement patterns of El Paso phase sites indicate that "Habitation sites generally occur along the Rio Grande or where runoff from mountains accumulates temporarily" (O'Laughlin 1980: 26). Residential or habitation sites not found in these locales are often found associated with playas located in the interiors of intermontane basins such as the Mesilla Bolson where agriculture would have been possible after heavy rain. Specialized activity or camp sites utilized during this phase are found associated with most environmental zones.

Explanatory Models

Until recently, there have been few attempts to delineate the specific processes of cultural change that may have operated in the

Table 3.2

EL PASO PHASE INTRUSIVE CERAMICS

Chupadero Black-on-white
Three Rivers Red-on-terracotta
Lincoln Black-on-red
Gila Polychrome
Agua Fria Glaze-on-red
Heshotauthla Glaze Polychrome
Arenal Glaze Polychrome
St. Johns Polychrome
Ramos Polychrome
Babicora Polychrome
Playas Red Incised*
Madera Black-on-red
Mimbres Black-on-white
Walnut Black-on-white
Galisteo Black-on-white
Tucson Polychrome

* Recent studies suggest this type may have been locally made.

Jornada region (Human Systems Research 1973; LeBlanc and Whalen 1980; Tainter 1979; Wimberly and Rogers 1977; Whalen 1981; Upham 1984). Most of this work has been of a relatively general nature dealing with models of cultural succession or demographic factors and has included consideration of much of the Jornada cultural sequence (Spoerl and Ravesloot 1982).

Archaeologists have traditionally viewed the Jornada Mogollon region as peripheral to major developments in other portions of the Greater Southwest (LeBlanc and Whalen 1980; Lehmer 1948; Whalen 1981; Wiseman and Beckett 1979). Even Lehmer, who defined the Jornada branch admits that his reconstruction of the culture history of the area "paints the people of the Jornada branch as an uninventive and conservative group who accepted new traits only under considerable foreign pressure." LeBlanc and Whalen (1980: 456) have perpetuated this viewpoint by suggesting that the less spectacular and small-scale development of the Jornada area, in contrast to the Mimbres region, occurred because of its peripheral position. Whalen (1981: 90) also states that the pit house-to-pueblo transition takes place about a century later in the Jornada area than in the central Mogollon area, and suggests that this situation "is simply an aspect of the general developmental lag resulting from the study area's peripheral position with respect to the Greater Southwest."

LeBlanc and Whalen (1980: 449), in comparing the Jornada to the Mimbres branch, have argued that:

> There are long periods where the nature of the subsistence strategies, the settlement patterns, and perhaps even social organization, are considerably different between the two areas. There is a clear temporal lag in many trait changes in the Jornada when compared to the Mimbres. More over, many Jornada cultural traits appear to have been somewhat simplified, or of less grand scale, relative to those of the Mimbres area.

The major difference evident between the two areas is that the adoption of surface structures took place in the Mimbres area by A.D. 1000, whereas it was not completed in the Jornada area until approximately A.D. 1200, a situation attributed to developmental lag in the Jornada area (Whalen 1981: 90).

There are, however, a number of other areas in the Southwest (for example, the Gallina area of New Mexico and the Upper Little Colorado, Black Mesa, and Kayenta areas of Arizona) where pit house architecture has been documented as late as A.D. 1200. The Jornada area cannot be considered an example of developmental lag simply because of the different timing of trait changes between this area and the Mimbres Valley. If so, certain other areas of the Southwest must also be considered in a similar manner. The concept of lag is definitely a relative one, since differing rates of cultural change are evident in various parts of the Southwest. For example, the eastern Jornada area may be seen as lagging behind the western Jornada area, or exhibiting a different rate of cultural change, while the western and southern

Jornada area exhibits a developmental sequence similar to areas such as the Gallinas (Tainter 1979: 381).

Although lag in the acquisition of material traits between the Mimbres and Jornada may be documented, such a "lag" certainly does not explain much in terms of differences or similarities in the processes of cultural change and development. Such comparisons generally do not provide meaningful information other than simple comparative documentation of material features unless reasons for differences in rates of change are addressed. Cordell and Plog (1979: 406) have pointed out the flaws of developmental schemes based on a progression from pit house-to-pueblo architecture and note that "there has been no systematic examination of either the physical environmental or demographic traits that correlate with pithouses or shifts from pithouses to surface structures."

This situation (of postulated cultural lag) becomes particularly clear when considering the Pueblo period (El Paso phase) of the southern Jornada. Whalen (1980b: 455) views the Pueblo period as representing a cultural continuum during the 200-year period, although minor differences do appear between the earlier and later portions of it. He feels, however, that the major adaptational shifts in the Jornada came about during the pit house-to-pueblo transition due primarily to a greater reliance on agriculture and increasing populations. He notes (1980b: 441) an increase in the variety and quantity of imported items in Pueblo times and feels that they may be linked to an increase in social differentiation.

> It appears that in Pueblo times, relatively more attention was given to import of items which may have functioned in the social sphere of culture, such as elaborately painted pottery and marine shell and turquoise, both for ornament manufacture (Whalen 1980b: 441).

Whalen also believes (1980b: 444) that the collapse of the Classic Mimbres (about A.D. 1150) "seems to have led to a new level of intensity of culture contact between southwestern New Mexico and south-central New Mexico/western Texas area." LeBlanc (1980a, 1983) argues that the radical changes evident in ceramic assemblages, pueblo construction techniques and site distribution after the Classic Mimbres phase represent an extreme break from the earlier Mogollon-Mimbres tradition. He suggests that a depopulation of the Mimbres region by Classic Mimbres peoples at around A.D. 1150 was the result of the rise of Casas Grandes as a regional trading center. Casas Grandes provided either economic or political pressure for the abandonment. Subsequent repopulation of the Mimbres area occurred by people politically dominated by Casas Grandes (LeBlanc 1980a: 294). The Animas and Black Mountain phases of southwestern New Mexico are seen as the outer fringe of the Casas Grandes system. This phase ends with the abandonment of the area at approximately the same time as Casas Grandes (mid-1300s).

Not only did the radical changes evident in the Mimbres area apparenty have an impact on the Jornada area, but Casas Grandes also may have affected Jornada societies to a greater extent than has previously been recognized. Schaafsma (1979) has noted the similarities in material culture between the Jornada area and the post-Classic Mimbres (Animas and Black Mountain phases), and feels that both regions should be considered as one phase. LeBlanc (1980a: 296) also notes these similarities and comments that

> It is unfortunate and somewhat confusing that geographically juxtaposed areas containing contemporaneous archaeological remains that demonstrate great similarity and continuity are designated as separate phases. The designation of something as a distinct phase normally has a temporal connotation or may denote a distinct cultural area occupied contemporaneously with another. This does not appear to be the case with the designation of the El Paso, Animas, and Black Mountain phases although they may originally have been intended to do so. In light of the high degree of similarity and continuity of these phases with the Casas Grandes phenomena, it is suggested that these phases be thought of as regional variants of the Casas Grandes culture. Thus, it may be more reasonable to speak of the Casas Grandes culture in the Animas, Black Mountain, or El Paso regions.

Whalen notes the similarity in general architecture and pueblo construction techniques between the two areas and the increased quantity of Jornada wares in the Mimbres area during the Animas, Black Mountain, and El Paso phases. However, he does not feel that Casas Grandes played anywhere near the same role in the Jornada area as LeBlanc attributes to the Mimbres area. He states (1980b: 445) that

> Data from south-central New Mexico and western Texas are ambiguous as concerns extent of relations with Casas Grandes. It can at least be suggested that whatever perturbations affected southwestern New Mexico in late Pueblo times were either absent or greatly diminished in the Jornada area, as the marked cultural break between the Classic Mimbres culture and the succeeding Animas period had no counterpart in the Jornada area.

We would argue, as Wimberly did (1979), that the role of Casas Grandes must be given greater consideration in attempting to understand the El Paso phase in the Jornada region.

> The florescence of Casas Grandes as a major inland commerical center, distinct from all previous developments in the Southwestern culture history, cannot be denied. Its position as the center of the regional economic unit of the period must be recognized in all future interpretations of the prehistory of the region . . . . The exact nature of this relationship is the key to understanding developments in the Jornada-Mogollon area during the final two to three hundred years of Mogollon culture history (Wimberly 1979: 88).

Three examples are presented below regarding the Jornada pueblo society as partial evidence that the data are not as "ambiguous" as indicated by Whalen regarding relations with Casas Grandes.

Traditionally, the Mimbres area has been considered as a major area of trade with Casas Grandes (and partially peopled by Casas Grandes populations in Animas-Black Mountain times). Mimbres Classic Black-on-white pottery is abundant at Casas Grandes prior to the mid-1100s (LeBlanc's 1980b chronology is used here), and Di Peso and others note (1974, Vol. 8: 143) that a wider variety of Chihuahuan wares are present in the Mimbres Valley than elsewhere in the Southwest. This statement may no longer be true based on recent surveys and excavations in the Jornada area where a variety of Chihuahuan wares are present in small quantities.

In addition, during the Medio period at Casas Grandes 99.9 percent of the imported ceramics came from the Southwest (Di Peso and others 1974, Vol. 8: 141). If the Gila Polychrome wares are considered to be exported wares, 94.8 percent of all the imported ceramics are El Paso Polychrome. Even if Gila Polychrome is considered an imported ware, El Paso Polychrome still represents a significant portion of the total imports (38.7%). Di Peso and others (1974, Vol. 8: 145) note that "the geographical area most important as a source of trade pottery was the lower Rio Grande drainage," and suggests that El Paso Polychrome jars brought into Casas Grandes may have contained salt (Di Peso and others 1974, Vol. 8: 141). Indeed, salt trails into the southern Tularosa Basin have been important well into historic times (Freeman 1981).

A second example, which suggests that a greater consideration should be given to the role of Casas Grandes in interpretations of the El Paso phase concerns rock art styles in late prehistoric times. Schaafsma (1975: 95-119) has defined the Jornada style of late prehistoric times as encompassing both the Mimbres and Jornada regions. She divides this style, consisting of a wide variety of geometric and naturalistic motifs, into an eastern and western phase which are distinguished mainly by "the presence of the more elaborate decorative aspects of the art in the east [Jornada area], and along with this qualitative difference, a richer element inventory, including significantly larger number of masks." The Jornada area certainly can not be viewed as peripheral or as one exhibiting cultural lag with regard to the development and sophistication of its rock art style, a style which is later present in pueblo areas to the north. With regard to the origins of this distinctive style, Schaafsma (1980: 235) comments:

> That Mexican prototypes can reasonably be sought for many of the iconographic features in the Jornada Style is suggested on the basis of a preliminary evaluation of the art itself, which contains a number of highly simiplified but nevertheless apparently Mesoamerican features, and by the cultural interaction that took place after A.D. 1000 between the Desert Mogollon and the Casas Grandes region.

A third example also possibly related to ceremonialism is a cache reported from the Hueco Bolson northeast of El Paso (Moore and Wheat 1951). It contained over 7000 shell objects in addition to a small number of stone (mainly turquoise) items. Most significantly, however, these artifacts were associated with seventeen broken vessels: seven Ramos Polychrome, one Ramos Incised, two Villa Ahumada Polychrome, one Chupadero Black-on-white, two El Paso Polychrome, and one Tucson Polychrome (Woodridge 1979: 218). Five of these vessels were "killed" in the Mimbres style evident in both the Classic and Animas-Black Mountain phases (LeBlanc 1977; Ravesloot 1979) and reported from Jornada burials.

The major point of the above discussion is that a consideration of the Jornada area as a peripheral one exhibiting cultural lag, and the interpretation of its cultural development in such a context, contributes little to explaining the nature of cultural change in the region. The continued acceptance of the Jornada region as peripheral to other areas of the Southwest, particularly the Mimbres and Casas Grandes may seriously affect our interpretations of the prehistory of the area (Spoerl and Ravesloot 1982).

Inventory of Previously Recorded Resources

The Santa Teresa study area is for the most part unknown archaeologically. Previous archaeological work conducted in the study area has consisted primarily of small-scale surveys conducted to provide clearance for seismic testing (Table 3.3). A review of previous work within the boundaries of the BLM parcels determined that only four sites had been recorded (Table 3.4). Each of these presumably functioned as specialized activity loci. Obviously, it is impossible to discuss classes of known cultural resources, and expected temporal and spatial distributions of resources on the basis of such a small sample. Therefore, this inventory of identified resources was expanded to encompass the entire Santa Teresa study area so that a more comprehensive understanding of the potential range and distribution of resources could be achieved.

The largest contiguous area studied in the Santa Teresa study area was surveyed from June to August 1981 by the Las Cruces BLM Office to inventory and evaluate the cultural resources of the Anapra Off-Road Vehicle Area (Taylor 1981). The proposed off-road vehicle area was located in Sections 4, 9, 10, and 11, and portions of Sections 3, 13, 13, 14, and 15 of T29S, R3E, and the S 1/4 of Section 33 of T28S, R3E of the Smeltertown 7.5 quadrangle. A 9-percent sample of the 4200 acres of public land was systematically surveyed. The sample consisted of eight 40 acre quadrants and 4.5 square miles (54.5 acres) of linear transects. Each quadrant was chosen randomly and surveyed with the aide of aerial photos by either one- or two-person crews spaced at 30-m intervals. Thirty-one archaeological sites and numerous isolated occurrences were recorded (Table 3.4). This included Worley Pueblo, a large El Paso phase village located on the breaks (that is, where the west mesa meets the floodplain of the Rio Grande) in the SE 1/4 of the SW 1/4 of the

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Table 3.3

PREVIOUS ARCHAEOLOGICAL WORK WITHIN THE STUDY AREA

Date of Fieldwork	Personnel-Institution	Project and Purpose of Investigation	Reference
April 5, 1976	Cultural Resources Management Division, New Mexico State University	Archaeological Reconnaissance of proposed hydrocarbon testing transects, in western Dona Ana County	Sudar-Murphy and Lambach 1976
January 31 - February 5, 1980	Cultural Resources Management Division, New Mexico State University	Survey of the three geothermal temperature gradient drill pad prospects totaling 105 drill pad sites	Bond 1980
November 1979 - February 1980	Cultural Resources Management Division, New Mexico State University	Reconnaissance of nine proposed hydrocarbon testing transects in western Dona Ana County, New Mexico	Heinsch 1980
August 21 - October 21, 1980	Cultural Resources Management Division, New Mexico State University	Archaeological clearance surveys on five testing transects for Petty-Ray Geophysical Company	Taylor and Brethauer 1980
January - July 1981	Cultural Resources Management Division, New Mexico State University	Archaeological Survey of 407 miles of Seismic exploration lines	Hilley 1981
June - August 1980	BLM, Las Cruces	Survey of the Anapra off-road vehicle (ORV) area	Taylor 1981
March - July 1982	Cultural Resources Management Division, New Mexico State	Archaeological Survey of 150 miles of Seismic testing transects	Lambach 1982

Table 3.4

INVENTORY OF CULTURAL RESOURCES IN STUDY AREA

Site Number	Site Type	Function	Time Period	Work Done	Institution
BLM 3026	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3027	Lithic scatter	Processing-procurement	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3028	Lithic scatter	Processing-procurement	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3029	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3030	Sherd-lithic	Processing-procurement	Jornada Mogollon	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3031	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3032	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3033	Sherd-lithic	Processing-procurement	Jornada Mogollon	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3034	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3035	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3036	Sherd-lithic	Camp	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3037	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3038	Sherd-lithic	Processing-procurement	Jornada Mogollon	June-August 1981	Las Curces, BLM (Taylor 1981)
BLM 3039	Lithic scatter	Processing-procurement	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3040	Sherd-lithic	Processing-procurement	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
*NMSU 862	Sherd-lithic	Processing-procurement	Mesilla-El Paso	January-July 1981	NMSU (Hilley 1981)
*NMSU 863	Lithic scatter	Processing-procurement	Unknown	January-July 1981	NMSU (Hilley 1981)
NMSU 864	Lithic scatter	Processing-procurement	Unknown	January-July 1981	NMSU (Hilley 1981)
*NMSU 865	Sherd-lithic	Processing-procurement	Mesilla-El Paso	January-July 1981	NMSU (Hilley 1981)
*NMSU 866	Lithic scatter	Processing-procurement	Unknown	January-July 1981	NMSU (Hilley 1981)
NMSU 887	Lithic scatter	Processing-procurement	Archaic	January-July 1981	NMSU (Hilley 1981)
NMSU 889	Sherd-lithic	Processing-procurement	Jornada Mogollon	January-July 1981	NMSU (Hilley 1981)
NMSU 890	Sherd-lithic	Processing-procurement	Jornada Mogollon	January-July 1981	NMSU (Hilley 1981)

* Sites within survey area

Table 3.4, continued

INVENTORY OF CULTURAL RESOURCES IN STUDY AREA

Site Number	Site Type	Function	Time Period	Work Done	Institution
NMSU 737	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU (Taylor and Brethauer 1980)
NMSU 738	Lithic scatter	Processing-procurement	Unknown	1980	NMSU
NMSU 739	Sherd-lithic	Processing-procurement	Archaic-Jornada	1980	NMSU
NMSU 740	Lithic scatter	Processing-procurement	Unknown	1980	NMSU
NMSU 741	Lithic scatter	Processing-procurement	Unknown	1980	NMSU
NMSU 742	Lithic scatter	Processing-procurement	Unknown	1980	NMSU
NMSU 743	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU
NMSU 744	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU
NMSU 745	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU
NMSU 628	Sherd-lithic	Camp	El Paso phase	1980	NMSU (Bond 1980)
NMSU 626	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU (Heinsch 1980)
NMSU 627	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU (Heinsch 1980)
NMSU 611	Sherd-lithic	Processing-procurement	Jornada Mogollon	1980	NMSU (Heinsch 1980)
NMSU 612	Sherd-lithic	Processing-procurement	Jornada Mogollon	1979	NMSU (Heinsch 1980)
NMSU 610	Sherd-lithic	Processing-procurement	Jornada Mogollon	1979	NMSU (Heinsch 1980)
NMSU 600	Sherd-lithic	Processing-procurement	Jornada Mogollon	1979	NMSU (Heinsch 1980)
NMSU 1354	Ceramic-ground stone	Processing-procurement	Jornada Mogollon	1982	Lambach 1982
NMSU 1355	Sherd-lithic	Processing-procurement	Jornada Mogollon	1982	Lambach 1982
NMSU 1358	Lithic scatter	Processing-procurement	Unknown	1982	Lambach 1982
NMSU 1359	Lithic scatter	Processing-procurement	Unknown	1982	Lambach 1982
BLM 3010	Pueblo	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3011	Sherd-lithic	Camp	Mesilla phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3012	Lithic scatter	Camp	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3013	Sherd-lithic	Camp	Archaic-Mesilla?	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3014	Lithic scatter	Processing-procurement	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3015	Lithic scatter	Camp	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3016	Sherd-lithic	Camp	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3017	Worley Pueblo	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3018	Worley Pueblo	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3019	Worley Pueblo	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3020	Sherd-lithic	Camp	Archaic-El Paso	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3021	Sherd-lithic	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3022	Sherd-lithic	Habitation	El Paso phase	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3023	Lithic scatter	Camp	Unknown	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3024	Sherd-lithic	Camp	El Paso Historic	June-August 1981	Las Cruces, BLM (Taylor 1981)
BLM 3025	Sherd-lithic	Processing-procurement	Jornada Mogollon	June-August 1981	Las Cruces, BLM (Taylor 1981)

SE 1/4 of Section 3, T29S R3E. Worley Pueblo, renamed the "Nuestra Senora de las Conejas" site complex by Taylor (1981), was determined to cover an area of 53 acres.

Table 3.4 presents an inventory of the 59 sites that have been recorded in the study area. Site types defined included pueblos, lithic scatters, and sherd and lithic scatters. On the basis of diagnostic projectile point styles and decorated ceramics, sites were found to date from the Archaic to the Late Pueblo periods.

In summary, a site file check for the study area indicates that archaeological resources previously recorded consist primarily of artifact scatters, which resulted from short-term procurement and processing activities.

Research Goals

The major objective of the survey, as determined by BLM management requirements, was to identify all cultural resources located in the project area, define the classes of resources represented, define the temporal and spatial variability of the resources in order to examine land-use patterns, and provide an evaluation of the research potential of the project area's resources. This information would provide the BLM with baseline information that could be used to manage these resources and determine if exchange of these parcels was appropriate.

A review of the archaeological literature on the Mesilla Bolson and surrounding areas (that is, the Tularosa Basin and Hueco Bolson) has identified gaps in our knowledge of the culture history of the region and has suggested a range of general and specific research problems that might be addressed through a study of the Santa Teresa cultural resources. Research problems that have been suggested include: (1) the refinement of the chronological sequence, (2) the nature and distribution of the Paleo-Indian and Archaic occupation, (3) a study of prehistoric land-use patterns through time, (4) the timing and significance of the pit house-to-pueblo transition, (5) the organizational and demographic aspects of Jornada Mogollon populations, (6) the changing role of agricultural and hunted and gathered resources in the subsistence strategy of puebloan groups, and (7) the relationships of the Jornada region to the Mimbres and Casas Grandes cultural areas (Carmichael 1982a; LeBlanc and Whalen 1980; Stuart and Gauthier 1981; Wiseman and Beckett 1979). The remainder of this chapter presents the research problems that were the focus of this study.

Research Problems

As discussed in an earlier section of this chapter, archaeological resources previously identified in the study area have consisted almost exclusively of sherd and lithic scatters presumably related to short-term procurement and processing activities. These resources have been functionally classified as limited-activity sites and temporary nonresidential camps. A large percentage of these locations exhibit evidence of multiple occupations spanning the entire regional culture history continuum. Therefore, it was expected that the majority of resources identified within the Santa Teresa survey area would be represented by this resource class. Unfortunately, the geomorphological evaluation (see Chapter 2) of the survey area indicates that the historic (that is, 500 years B.P.) movement of sand dunes within the Mesilla Bolson has greatly altered the visibility and integrity of the archaeological resources. Nevertheless, it was concluded that these visible and deflated resources could contribute to our understanding of the region's prehistory. It was decided to focus the research on several general and interrelated regional problems.

The first research problem deals with general chronological considerations, specifically documenting the temporal variability in the resources of the survey area. An important aspect of this focus was the identification of multicomponents; of particular interest was the documentation of preceramic components. The second major problem concerned the functional classification of resources. Variability in the range of activities that potentially occurred at specific loci was investigated on the basis of an analysis of surface assemblage artifact diversity, rather than nonassemblage diversity (that is, site size, density of artifacts, and so on) as has commonly been the approach used by most archaeologists working in the Southwest. The third major research problem addressed is the changing nature of prehistoric land-use patterns within the Mesilla Bolson. Obviously, the extent to which land-use patterns can be described is based upon the success of the chronological and functional studies. Finally, a methodology is developed to improve our interpretations of surface artifact scatters which are related to the foraging activities of all prehistoric peoples in the Southwest. These general research problems and specific questions related to them are discussed in the following pages.

Chronology

The chronological relationships between sites must be considered before the prehistoric subsistence and settlement systems of the region can be discussed. This problem is not an easy one to solve because most of the sites already recorded in the study area possess multiple components. The temporal placement of sites will be accomplished by applying the techniques used by Carmichael (1982a) for the southern Tularosa Basin and Whalen (1977, 1978, 1980a) for the Hueco Bolson. These techniques include: the identification of intrusive ceramic types, identification of diagnostic projectile points, variability in the rim forms of local brown ware ceramics, and the relative diversity of the raw material types of the lithic assemblages. Phase assignments made on the basis of these relative dating techniques are evaluated by the radiocarbon analysis of charcoal from associated features and obsidian hydration dating.

Chronometric dates derived from the Santa Teresa cultural resources could provide significant new information that could be used to reconstruct Jornada Mogollon culture history. As Wiseman and Beckett (1979: 398) note:

> Paramount to the success of any fine-grained analysis of archaeological data is the construction of an accurate chronology. Thus far, such a chronology does not exist for Jornada Branch, and most dates which have been derived from individual projects are based on ceramic data. Limited use has been made of tree-rings, archaeomagnetic sampling, and radiocarbon determinations, but much remains to be done before a reliable chronology adequate for intra-regional and regional comparisons will be a reality.

Furthermore, chronological control may help resolve classification problems, particularly for unclassified sites such as ubiquitous sherd and lithic scatters. The temporal placement of unknown ceramic and lithic scatters is a significant general southwestern research problem that has not been adequately addressed (Stuart and Gauthier 1981: 381). The Santa Teresa cultural resources could potentially contribute to its resolution.

Preceramic Occupation

A review of the culture history of south-central New Mexico has indicated that relatively little is known about the Archaic occupation and virtually nothing about the Paleo-Indian occupation. Most of the evidence for these occupations consists primarily of surface finds of isolated projectile points. Furthermore, the West Mesa is known to be a favorite collecting area of Folsom and Archaic points by local residents (Thomas O'Laughlin, personal communication). The possibility exists that the proposed survey area may possess at least one, if not several intact and stratified preceramic sites. These cultural resources could contribute significant information regarding the preceramic occupation of south-central New Mexico. Specific research questions to be addressed include:

1. What is the nature and distribution of the preceramic occupation of the study area?

2. What types of raw materials were used to produce tools made during the Paleo-Indian and Archaic.

3. Did Paleo-Indian and Archaic populations exploit similar or different environments?

Settlement Classification

Archaeologists working in the Southwest have traditionally classified sites on the basis of several attributes such as site size, density of artifacts, and the presence or absence of features, particularly masonry architecture, to differentiate between settlement types. Site types commonly defined include large and small residential pueblos, farmsteads, field houses, base camps, specialized procurement camps, lithic quarries, and so forth. Formulated site typologies are then used to discuss variability and regional subsistence-settlement systems. Subsistence-settlement reconstructions for the Jornada Mogollon area have also followed this conventional approach (see Whalen 1977, 1978, 1981; Skelton and others 1981; Carmichael 1982a). Whalen (1977, 1978, 1981), for example, has constructed a site typology for the Hueco Bolson based on site size, types of artifacts present or absent, artifact densities, types of features present or absent, and densities of particular types of features.

Traditionally constructed settlement typologies contribute little to the study of prehistoric subsistence-settlement systems because variability in the range of activities performed and duration of occupation at individual settlements cannot be measured using traditional labels such as habitation and limited activity (Binford 1982; Reid 1982: 193-199; Whittlesey and Reid (1982: 205-216). As a result, settlement typologies which utilize nominal labels fail to identify the diverse variability in procurement and processing activities that may have occurred at sites in the regional subsistence-settlement system.

Variability in the range of activities that potentially occurred at settlements located in the Santa Teresa study area will be assessed by measuring artifact diversity and nonassemblage variability rather than traditional measures. Diversity indices for the Santa Teresa resources will be calculated by using a formula constructed by Reid (1982: 202) to measure assemblage diversity and functionally classify settlements recorded by the Cholla project. The specifics of this index are discussed at length in the methodology chapter.

Land-Use Patterns

Recent surveys of the Hueco Bolson (Whalen 1977, 1978) and the southern Tularosa Basin (Carmichael 1982a) have provided considerable information about prehistoric land-use patterns in the Jornada region. The BLM survey parcels presented an excellent opportunity to evaluate settlement patterning defined during the above survey projects. An inventory of the project area resources indicates that questions related to resource procurement and procesing strategies could potentially be addressed with the BLM survey data. Research questions to be addressed include:

1. What type of temporal and spatial variability was present in the settlement patterns of the study area?
2. How do the settlement patterns of prehistoric populations in the Mesilla Bolson compare to those defined for the southern Tularosa Basin and Hueco Bolson?
3. To what extent do playas in the Mesilla Bolson predict settlement locations?
4. Is there a significant correlation between mesquite dunes and cultural resources within the Mesilla Bolson?

Conceptual and Methodological Considerations

A review of previous archaeological work in the Santa Teresa study area has determined that surface artifact scatters related to the foraging activities of all prehistoric periods were the most commonly recorded resource class. Archaeological resources associated with this type of activity have posed conceptual and methodological problems for archaeologists, because most foraging activities result in concentrations of artifacts (that is, isolated artifacts, and so forth) that are less than the minimum definition of a site. The problems associated with the use of the site concept as the basic observational unit when dealing with nonsedentary activities, and the innovative methodological approaches developed to address this problem, are discussed at some length in the following chapter on methodology.

Chapter 4

HISTORIC PERIOD RESOURCES AND RESEARCH GOALS

Lyle M. Stone

In reviewing the land use and culture history of the Santa Teresa study area and immediate vicinity, it is apparent that the Rio Grande River valley was settled at an early date and that the river course (which borders the east side of the study area for a very short distance) was a major route for the movement of Spanish settlers, explorers, and missionaries (Meinig 1971, Beck and Haase 1969). In contrast, the majority of the adjacent study area was marginal in terms of its documented land use history. Historically, the most important land use activities within the area relate to the establishment of a boundary between the U.S. and Mexico, to ranching, and to the construction and use of two railroads. There seem to have been few natural environmental features (such as rivers, mineral resources, arable land) that would have stimulated the extensive use or occupation of this area historically.

History

The earliest non-Indians to enter the study area may have been Cabeza De Vaca and three other Spaniards who survived a shipwreck off the Texas coast in 1528 and then traveled along the Pecos River northward intoTexas, west across the Rio Grande above El Paso, and southwest into Mexico, reaching Mexico City in 1536. This party may have crossed a portion of the study area. Numerous Spanish missionaries, explorers, and colonists used the Rio Grande route northward between the 1580s and the early 1800s. The more notable of these include the Rodriquez-Chauscado (a Franciscan missionary) expedition into central New Mexico in 1581 to 1582; an expedition by Antonio de Espejo (a rancher) and Father Bernardino Beltran (a Franciscan) northward in 1582 to 1584; an unsuccessful colonizing expedition under Gaspar Castáño de Sosa (Lieutenant Governor of Neuvo Leon) in 1590 to 1591; and a later colonizing effort by Don Juan de Oñate in 1598. Oñate's expedition is considered to have been one of conquest of the Indian tribes (pueblos) of central New Mexico. Oñate is also credited with the establishment of permanent Spanish settlements among the pueblos. The Pueblo Revolt of 1680 led to the removal of direct Spanish influence from the upper Rio Grande area. In 1698 an expedition under the command of Don Diego de Varga reestablished Spanish authority in New Mexico.

During the late seventeenth, eighteenth, and early nineteenth centuries Spanish influence in New Mexico continued to expand and eventually resulted in the settlement of much of the Rio Grande Valley and central New Mexico. El Paso Del Norte (near present day El Paso, Texas), was founded in 1680 by Spanish peoples moving away from the area of pueblo revolt to the north.

Mexico (including present day New Mexico) achieved independence from Spain in 1821. With the conclusion of the Mexican War (1846), the adoption of the Treaty of Guadalupe Hidalgo (1848), and the ratification of the Gadsen Purchase (1854), the present day boundary between the United States and Mexico was established. The U.S. assumed control of the New Mexico Territory and established military posts throughout the territory, including several in the vicinity of the Santa Teresa Study Area (Ft. Fillmore, in the Rio Grande near Las Cruces, 1851 to 1862; Ft. Cummings, in east-central Grant County to the northwest, 1863 to 1886; and Ft. Selden, located north of Dona Ana, 1865 to 1890). During this period (1821 to 1854), several nearby communities were established on the Rio Grande, including Mesilla (by 1850), Dõna Ana (which was located within the area of an 1839 land grant, Dõna Ana Bend Colony), and Las Cruces (1849). Several other nearby land grants were also made by the Republic of Mexico during this period, including the Refugio Colonies, located immediately northeast of the study area on the west side of the Rio Grande (1852), and Santa Teresa (1852 or 1853), located east of the study area on the Rio Grande.

The existing boundary between the United States and Mexico was surveyed in 1854 to 1855 under the direction of Major William H. Emory. A report of Emory's survey was published by the U.S. Government in 1856. Emory's survey resulted in the erection of monuments along the international boundary at irregular intervals. The boundary was resurveyed by Lt. Colonel J. W. Barlow in 1892 under the auspices of a second International Boundary Commission (Ames 1977).

Between about 1854 and the construction of the Southern Pacific Railroad along the northern boundary of the area in 1880-1881, an area to the north of the study area was used as an east-west transportation corridor. It included the routes of the Butterfield Stage, and the California-Arizona, and Slaughter cattle trails. With the completion of a main Southern Pacific Railroad line between San Francisco and El Paso in 1881, a major route for the transportation of commodities and people between markets throughout much of the southwestern U.S. was established. Within the study area, several named railroad sidings and communities were established along the Southern Pacific route; these included Afton (1924 to 1941), Rutter Siding, Lanark (1905 to 1940s), Strauss (by 1933), Vevay, Lizard, and Anapra (1907 to 1919), now Sunland Park. A second railroad route (the El Paso and Southwestern Railroad), which is just north of and roughly parallel to the U.S.-Mexico border, was completed in 1900 by the Phelps-Dodge Mining Company as a route between smelters in Arizona, and El Paso. The Southern Pacific Railroad acquired the El Paso and Southwestern Railroad in 1924. Early sidings along the El Paso and Southwestern within the study area included Noria and Mastodon. Noria, Vevay, and Lanark are shown on a 1917 U.S. Geological Survey topographic map of the area. Most of the noted communities and sidings are mentioned in a 1933 report on the Southern Pacific lines between New Orleans and Los Angeles (Darton 1933).

It is probable that ranching developed within the project area after the completion of the Southern Pacific Railroad and before about 1900. The locations of Herrington's Home Ranch and Herrington's Lower Ranch are shown on the 1917 U.S. Geological Survey quadrangle for the area. A Norwood Ranch and a Braidfoot Ranch are shown on a 1943 U.S. Geological Survey map.

During the mid-teens, and in response to the Mexican Revolution and the First World War, U.S. troops under the command of General John J. Pershing, were stationed at various locations along the U.S.-Mexico border. It is possible that such temporary military camps were present in the study area.

Ethnohistorically, different Native American groups may have been present in or near the study area at different times, depending on the information source consulted. During the 16th and 17th centuries, two groups that shared a Uto-Aztecan language affiliation, the Jocomes and Janos (Hale and Harris 1979), were present to the west and south of the study area. The Jocomes are one of the groups thought to have occupied Casas Grandes, a major prehistoric site located to the south in west-central Chihuahua (Di Peso 1974). The Sumas, a third Uto-Aztecan group, may have ranged through the study area (Houser 1979, Spanding 1953, Gerald 1974). On the east at this early time were the Jumanos, also of Uto-Aztecan linguistic affiliation. The Mansos (Kiowa-Tanoan language family) were present on the north and east (Swanton 1953). During the 1700s and early 1800s the Mimbres (Chiricahua) Apache are thought to have been located northwest of the area, and the Sumas, Janos, and Jocomes on the south and west (Schroeder 1974). The Mescalero Apaches occupied areas east of the Rio Grande during this period.

Study Area Historic Sites

This brief historical overview of the general study area provides a context or perspective for the identification and interpretation of historic sites within the more specific survey area. In defining the kinds of historic cultural behavior (and site producing activities, factors, and events) that characterized the study area, it has been observed that the study area is essentially peripheral to nearby regions (particularly along the Rio Grande River valley to the north and east) having a long-term and intense land-use history. It is not surprising to note, therefore, that ranching, boundary survey, and railroad construction, use, and maintenance are the primary potential site-producing activities represented in both the study and survey areas. It is doubtful that the settlement and use of the adjacent Rio Grande River valley by Spaniards, Mexicans, and Americans would have produced substantial historic sites within the study area; none have been identified in the sources consulted in preparing this overview.

Evidence of late nineteenth and early twentieth century ranching (for example, houses and associated ranch headquarter facilities, wells and water tanks, fences) should be present to a limited extent within the study area. Although specific ranch sites have not been documented within the survey area, it is possible that such sites or features were present historically. Sites related to Emory's 1854 to 1855 survey of the U.S.-Mexico boundary should be present along the border. Boundary survey markers, surveyors' campsites, and possibly access roads from both the Emory survey and the 1892 Barlow survey may be present within the survey area.

The majority of historic sites within the general study area probably relate to the construction, use, and maintenance of the Southern Pacific Railroad (1880 to 1881) and El Paso and Southwestern Railroad (1900). Railroad sidings and small communities or construction camps occupied by railroad workers are identified above; most of these are present on 1930s and 1940s maps of the area. Other railroad features such as culverts, bridges, and abandoned grades should also be present. In considering the specific survey area, however, it is noted that the El Paso and Southwestern Railroad line crosses only one square mile section of the area. No sidings or small construction camps appear to have been present in this section. An abandoned railroad grade and culverts or related structural features may, however, exist in this particular section. Notably, Mastodon Siding is located on the El Paso and Southwestern grade just outside the survey area on the north. Darton (1933: 163) indicates that this siding is "so named because the remains of a mastodon were excavated in the slope on the northeast." This excavation site is probably in the survey area (Section 31 of T28S R3E).

Although it has been noted that General John J. Pershing established military positions on the Arizona and New Mexico borders with Mexico, it is not known whether such features are present in either the study or survey areas. Other potential study area sites include an abandoned railroad grade (probably an early Southern Pacific alignment) located in the extreme east end of the area, isolated wells; campsites and roads used by early Spanish and Mexican explorers, missionaries, and settlers (in the east end of the study area); campsites occupied by any of the Native American groups mentioned above; U.S. military campsites; and isolated structures such as a cabin dwelling reported to be located in Kilbourne Hole (Sharp 1984: 53).

Historic Research Problems

The kinds of historic and ethnohistoric sites which may be present within the specific survey area (for example, railroad, ranching, boundary survey features, campsites) suggest several potential areas of research interest that might be profitably addressed and should be considered in formulating field survey and data recovery strategies. In terms of developing an approach to the field identification of historic sites, the following should be noted:

1. Most historic sites in the specific survey area will occur on or immediately adjacent to the U.S.-Mexico border and along the

abandoned El Paso and Southwestern Railroad grade. These features should be intensively surveyed for the presence of historic sites. Arrangements should also be made with the International Boundary and Water Commission (U.S. Section) in El Paso to survey the 60-foot-wide area on the north side of the border that has been reserved for boundary maintenance purposes.

2. The locations of boundary survey campsites and related features may be identified in the reports and correspondence of Emory and Barlow. These documentary source materials should be consulted prior to the initiation of field survey activities.

3. U.S. General Land Office land survey maps, if available for the project area, should be consulted. It is hoped that this source would define additional sites within the specific survey area.

4. Homestead and grazing entry records for the general study area should be consulted to provide a perspective on historic ranching and other land-use activities that may have occurred.

5. Isolated historic sites may occur in areas other than in association with the El Paso and Southwestern Railroad grade or the U.S.-Mexico border. Such sites would presumably be identified during the normal course of the project area survey, providing that the intensity of coverage is adequate.

Areas of archaeological and historical research interest that are suggested by the documented history of, and possible sites within, the project area and that could be addressed through both survey and data recovery procedures are reflected in the following series of questions pertaining to the railroad construction and boundary survey campsites.

1. What types of quarters and associated facilities (that is, dining, equipment storage, sanitation) were established for laborers and other camp occupants?

2. What cultural features defined a typical camp layout and how were they arranged?

3. What was the ethnic composition of labor parties?

4. What factors or conditions led to the selection (and spacing) of campsite locations?

5. To what extent did construction camps utilize locally available resources for subsistence and housing? Were expendable consumer goods (that is, food, clothing, and so forth), tools, and equipment obtained locally (at El Paso) or were they imported from external market sources?

6. Were there differences between the composition and layout of campsites occupied by the Emory and Barlow parties?

In relation to U.S.-Mexico boundary markers, it should be determined whether there are differences in the structure and composition of markers erected by the Emory and Barlow parties. Presumably Barlow would have repaired or replaced Emory's markers that had been removed or damaged, erecting new monuments as necessary.

In relation to possible features along the abandoned El Paso and Southwestern Railroad grade;

1. What features are present?
2. What levels of construction technology do these features reflect, and, if comparative data are available,
3. Were there physical differences between the construction of such features by the Southern Pacific and the El Paso and Southwestern Railroad?

Chapter 5

METHODOLOGY

Cynthia Irwin-Williams and John C. Ravesloot

Archaeological Units and Human Hunter-Gatherer Behavior in the Southwest

The nature of the surface archaeological record of foraging activities relating to all periods of occupation of the desert Southwest, provides crucial conceptual and methodological problems for the archaeologist. At the heart of the dilemma is the relation between the kind of archaeological record produced by hunter-gatherers and the concept of the archaeological site which is central to most archaeological thinking. As broadly defined, the site may be any place where there are found traces of human activity or occupation. In practice, however, the site concept was derived from studies of sedentary peoples and tends to be a specific geographic location with implied or identified boundaries, and to contain evidence of unusually concentrated activity, features, structures, and so forth.

The problems associated with this usage of the site concept are two-fold: practical and conceptual. In practical terms, the site concept always proved troublesome in dealing with the hunter-gatherer record, particularly in relation to site identification, multicomponent occupation, recognition of temporal affiliation, and assessment of the integrity and behavioral significance of apparent spatial-artifactual relationships in the face of geomorphic process. Further, many human activities leave traces below the minimum definition of a "site," and methods currently in use to identify minimal sites are subjective and inconsistent. Most detrimental of all is the effect of the legislative and regulatory requirements which structure cultural resource management, and which have resulted in the employment of the "site" as the basic archaeological unit in most contemporary research.

This inconsistency in definition and application of the site concept is very significant in the recording and interpretation of the archaeological data base in the south-central New Mexico, west Texas area. For example, in a comprehensive work on the adjacent Tularosa Basin Carmichael (1982a) identified more than twice as many sites per square kilometer than previous investigators (Skelton and others 1981) in the same area, primarily because of differences in definition. Needless to say, these differences will dramatically affect reconstructions of settlement pattern, interpretation of population size change, and so forth.

Conceptually, the site as the basic observational unit is inappropriate to any nonsedentary contexts. As noted by Thomas (1975), Yellen (1977), Foley (1981a, b, c), and others, the character of hunter-gatherer occupation does not lend itself to clear site definition. Although Binford (1980, 1982) and others have contributed substantially to an understanding of the phenomenon by distinguishing different functional types of sites, these are still arbitrary taxonomies and not necessarily representative of specific hunter-gatherer reality. Indeed any universal site taxonomy is normative by nature and can lead to interpretive distortion.

Essentially, all of the recent research in the Southwest has employed the site as the basic archaeological unit. As noted above, this is mandated to some degree by the nature of the cultural resource management regulatory structure. Several of the larger and more sophisticated projects have developed Archaic (hunter-gatherer) models involving distinctions between types of sites, such as base camp, limited activity site, home base, limited base, task specific site, satellite site, and so forth (for example, Vierra 1980; Moore 1980; Sessions 1979; Biella and Chapman 1979; Vogler, Gilpin and Anderson 1983; Del Bene and Ford 1982; Anderson and Gilpin 1983). These distinctions are usually based on specifics of assemblage content, assemblage size, and assemblage diversity. A few employ specific ethnographic analogue models (Schaafsma 1977) or propose region or area specific annual economic cycles (Wait 1976; Vierra 1980; Sessions 1979; Vogler 1982; Vogler and others 1983).

In spite of the impressive quantity and generally high quality of this research there remain however unresolved problems. None is more pervasive than the use of the "site" as the basic indivisible unit of analysis. Few researchers take into any real account the overwhelming problems presented by multicomponent surface sites, which probably make up the bulk of the record and which inevitably occasion temporal and functional blurring. It is very possible that this multicomponent single-surface site phenomenon is responsible for certain recent interpretive controversies concerning the sedentary-nonsedentary nature of the late prehistoric occupation of New Mexico (Upham 1984).

An even more fundamental effect of this approach is the inescapable implication that hunter-gatherer behavior was actually organized in terms of these easily recognizable concentrated activity sets. Employing normative taxonomies of different kinds of sites only adds further assumptions about the structure of group behavior (for example, base camps-special activity sites connote specific mobility strategies and so forth; Binford 1980). The definition of site types in terms of size ignores the problem of multicomponent occupation of the same surface. Simply adding specifics of content-diversity does not take into account the increasingly well recognized relation between sample size and sample diversity (Kintigh 1984). In all of these approaches, the bulk of the record of the wide and complex range of human behavior is compressed into two or three predefined site types. As a result of these and other difficulties, many of the interpretive models proposed are limited by their own assumptions and are not capable of yielding independently testable predictions. Further, depending on the admittedly inconsistent lower threshold definition for "site," some significant portion of the archaeological record is simply not recorded or is irregularly dealt with as "isolated artifacts" and so forth. When attempts are made to use this kind of archaeological record to test the implications of large-scale theories, such as the relation of subsistence behavior to resource diversity, further limitations of the unrestricted site concept become apparent.

Because of these basic practical and conceptual problems, it was essential to develop a methodology for recording the full range of the Archaic archaeological record, without imposing on it any a priori normative taxonomic structures. At the same time the methodology for the Santa Teresa study area had to be sensitive to specific problems presented by regional archaeology, local topography and the management needs of the Bureau of Land Management.

Nonsite (Off-site) Archaeology

Thomas (1975), Bettinger (1978), and Dunnell and Dancey (1983) pioneered and employed the "nonsite" approach to archaeology with considerable success, using artifact density and distribution studies to test predictions from ethnographic models. More recently, Foley (1977, 1978, 1981b) has developed a broader theoretical base for the study of nonsedentary peoples using an "off-site" approach. The assumption underlying all of these studies is that the hunter-gatherer record is spatially continuous. It is structured in terms of the location of a range of activities which reflect energy procurement and use in specific spatial relation to its source. These activities are not easily segmented into a limited number of discrete localities (sites), but occur regularly or irregularly across the resource landscape. Certain localities with a high frequency of activities may be considered in some sense as settlements or camps, and so forth. However, this reflects differences in degree, rather than in kind, from other locations of economic activity. This approach is believed to more accurately reflect ethnographic and archaeological forager behavior than the site based method (Yellen 1977).

In the most relevant investigations, the density and distribution of artifacts and environmental parameters from large (200 m to 500 m) spatial units have been employed (for example, Thomas 1975). However, some difficulties were encountered (Bettinger 1978) which, it is believed, relate to the very large uniform and noncontiguous spatial units employed (which obscure smaller-scale phenomena and large scale continuous patterns). In addition, difficulties were encountered in affecting an interface between the explicitly "nonsite" concept and concentrations of material which did in fact fit the traditional site definition (Bettinger 1980).

The Density-Dependent Method

To provide the core for the methodologic requirements outlined above, in Phase I of this project a series of new methods for recording the archaeological data base were developed and tested (1981 to 1983). Taken together they have been termed the Density-Dependent Method (Irwin-Williams and others 1981). The method is derived from the same underlying assumptions as other "nonsite" or "off-site" methods, but is believed to be better able to deal with both large and small scale patterned variability, and to correlate with the site concept.

The Density-Dependent Method focuses on the individual artifact and feature in its environmental context as the basic unit of observation and analysis. The character of the archaeological record of hunter-gatherers is seen primarily as a result of a patterned system of human economic behavior (exploitative strategy) interacting with the enclosing environment. This behavior produced a range of derivative artifacts, features, and so forth, reflecting the specific activities involved. The quantity, spatial dispersion, assemblage diversity and interassemblage morphofunctional and technological variability of these artifacts constitute the primary direct source of archaeological data.

The Density-Dependent Method is characterized by the following elements. Its objective is to document the large and small-scale distributions of artifacts and features in space by recording in terms of 100-square-meter units aligned in regionally stratified transects. Additional sampling measures employed within the 100-square-meter units are determined by the artifact density and dispersion, large- and small-scale topographic relief, and evidence of artifact redeposition. The character of the archaeological materials themselves is recorded and analyzed both in the field and subsequently in the laboratory. This information on artifactual material is accompanied by the maximum practical record of environmental information as an indicator both of potential resource distribution and of alteration by natural processes (Irwin-Williams and others 1984a).

This method provides a consistent data base that can be expressed quantitatively in terms of artifacts per square meter and thus provides a framework for comparability across archaeological space and also between investigators. The use of linear arrangements of 100-square-meter units is appropriate, since transects have repeatedly been demonstrated to provide the most accurate basis for regional sampling and pattern recognition in ecology, geography, and archaeology (Haggett 1965; Hodder and Orton 1976; Plog 1976). In addition, transects offer a greater degree of flexibility and require fewer assumptions than the resource catchment-quadrant approach. In brief, the concept of continuous artifact distribution reflecting long-term patterned behavior plus geologic process, is a more accurate representation of hunter-gatherer land-use patterns than a more rigid structure tied to an *a priori* site taxonomy. The method is completely compatible with the site based approach. If it is desirable to maintain a thoroughly quantitative record, a series of archaeological units may be defined as sites using definitions that will be based on the recognition of polythetic sets, directly reflecting artifact density and concentration, size modality, analytic artifact class, and associated environmental setting. In this way, the range of site "types" defined can describe the most accurate possible representation of prehistoric land use.

Alternatively, as in the present study, the two approaches may be used in conjunction with each other and to supplement each other. The use of traditional methods of recording sites, isolated manifestations, and isolated artifacts produced a data base that satisfied the management requirements of the Bureau of Land Management. It is comparable to that available from other nearby areas, although, as noted above, problems of inconsistency in the definition of the "site" continue to plague efforts at comparison and interpretation between regions.

In addition to the traditional record, an effort was made to document and quantify the continuous distribution of archaeological materials over the landscape, employing either the Density-Dependent transect approach with collection, or in-field artifact counts. Numerical data is available on about one-half of the study area, and a total of about 87 percent is accessible by extrapolation to quantitative analysis. This represents a unique record in Southwestern archaeology. Details of the methodology as applied at Santa Teresa are discussed below.

Field Methodology for the Santa Teresa Project

Given the specific parameters of the situation in the Santa Teresa study area it was clear that it would be necessary to derive a field strategy that would serve several objectives. These include (1) recognition of locations traditionally termed sites, and recognition of less well-defined isolates and concentrations to fulfill the management needs of the Bureau of Land Management; (2) integration of this information into the most complete possible record of continuous distributional (off-site) information commensurate with time constraints; and (3) integration of this information with complementary topographic geomorphologic and regional archaeological data so as to approach the specific research problems identified at the outset.

Geomorphologic Basis for Areal Sampling

As outlined in Chapter 2, an assessment of environmental variability in the survey area was made by geomorphologists, Fred Nials and Jonathan Davis, prior to archaeological field reconnaissance. This assessment was conducted to determine the extent to which the environment may have affected prehistoric land use patterns, and to consider the visibility and integrity of potential archaeological resources. Three major geomorphologic zones and nine subzones were defined for the survey area on the basis of field inspection and aerial photos. On the basis of this environmental study two distinct types of resources were expected: sites possessing high visibility-low integrity and those possessing low visibility-potential integrity. This geomorphologic assessment suggested that only Zone 3 (Parabolic Dune Zone) might possess intact cultural resources, although visibility would be poor due to modern dune cover. The distribution of the defined zones for the survey area are geographically illustrated in Figure 2.3. A central fact that emerged from the geomorphologic studies is that the primary distinctions recognized reflect simply degree of sand cover and visibility, rather than any intrinsic geologic structuring of resource zones. This uniformity of resources was of considerable significance in subsequent land use studies. It could be predicted that variation in activity patterning would reflect primarily topographic and distance relationships rather than differential availability of distinction of floral and faunal resources.

Field Strategies

Ultimately, a two-phase program involving three primary strategies was developed to address research questions and expedite fieldwork to meet Bureau of Land Management scheduling requirements. The three strategies included (1) recognition and recording of traditional units employed in contemporary surface archaeology (sites, isolated manifestations, and isolated artifacts); (2) a limited transect-based sample of surface materials employing the Density-Dependent Method; and (3) a mapped in-field count of artifacts by class for the majority of the study area, subject to time constraints.

These strategies were employed in a two phase program. The first phase consisted of a minimum 10 percent sample of each geomorphologic zone using the Density-Dependent Method and traditional site based methods of recording and collecting, followed by field laboratory analysis to make preliminary determinations on artifact distribution and density. This phase provided a minimum sample for verification of geomorphologic-based sampling procedures. It also yielded a minimum sample for determination of continuous artifact distribution in relation to traditional site location, and primary morphofunctional artifact distribution.

The second phase was focused on a complete survey of Zones 1 and 2, and employed a combination of traditional unit recording and collection, together with field counts of artifact classes by 100-square-meter unit for most units in the zone, within available time constraints. Zone 3 was also subjected to additional sampling (about 30%) and field counts, which tended to verify the geomorphologic predictions concerning archaeological visibility. The specific procedures employed in Phase I and Phase II of the program are discussed in detail below.

Phase I

The first phase of the project included an instrument survey and a minimum 10 percent inventory and data recovery of each major geomorphologic zone using a modified version of the Density-Dependent Method.

This method was employed as a major component of the survey because it provides a means for maximum retrieval of information from cultural resources related to hunting and gathering activities. A review of existing literature and a preliminary field reconnaissance indicated that cultural resources encountered in the project area would be predominantly represented by the remains of specialized activities such as food procurement and processing. Furthermore, it was suggested that the information potential of this class of archaeological resources could be completely recovered using the transect recording and collection method, because resources within the study area were expected to be completely deflated. In addition, it was felt that the BLM Santa Teresa Project represented a unique opportunity to evaluate the use of a modified version of the Density-Dependent Method within a cultural resource management context.

The first step in the proposed field strategy entailed instrument survey to provide locational markers. It was proposed to establish a grid system over the survey area that was tied to UTM locations. However, scheduling problems necessitated the use of legal subdivision (section and quarter section) lines rather than UTM´s. This grid system was necessary to insure accurate site location in the absence of natural and/or cultural landmarks and provide the spatial control needed for the Density-Dependent Method. Initially, BLM cadastral surveyors located the majority of section and quarter-section markers present prior to our instrument survey. These section markers were used to place transects across the study area which were composed of linear arrays of 100-square-meter units across the study area. All transects located along the section and quarter-section lines and some additional ones were laid using instrument survey, while the remaining north-south transects were placed using a compass. North-south transects were numbered OW to 47W, while individual 100-square-meter units were assigned southern coordinates beginning with OS for the northern most unit (Fig. 5.1).

Archaeological inventory and data recovery of the Santa Teresa survey area initially focused on completing a minimum 10 percent sample of the survey area using the Density-Dependent Method. This sample included transects OW, O8, 16W, 31W, and 47W and was used to (1) test the density, visibility, and integrity predictions of cultural resources by geomorphological zones; (2) determine if intact stratified sites or features, or both, are present and visible in Zone 1; (3) determine if all of Zone 3 needed to be completely surveyed; and (4) determine if time constraints allowed complete inventory and data recovery of all of Zones 1 and 2 using the Density-Dependent Method.

In addition to the continuous quantitative information derived from the transect units, it was essential to make an appropriate record of traditionally recognized archaeological resources. These resource classes are summarized below.

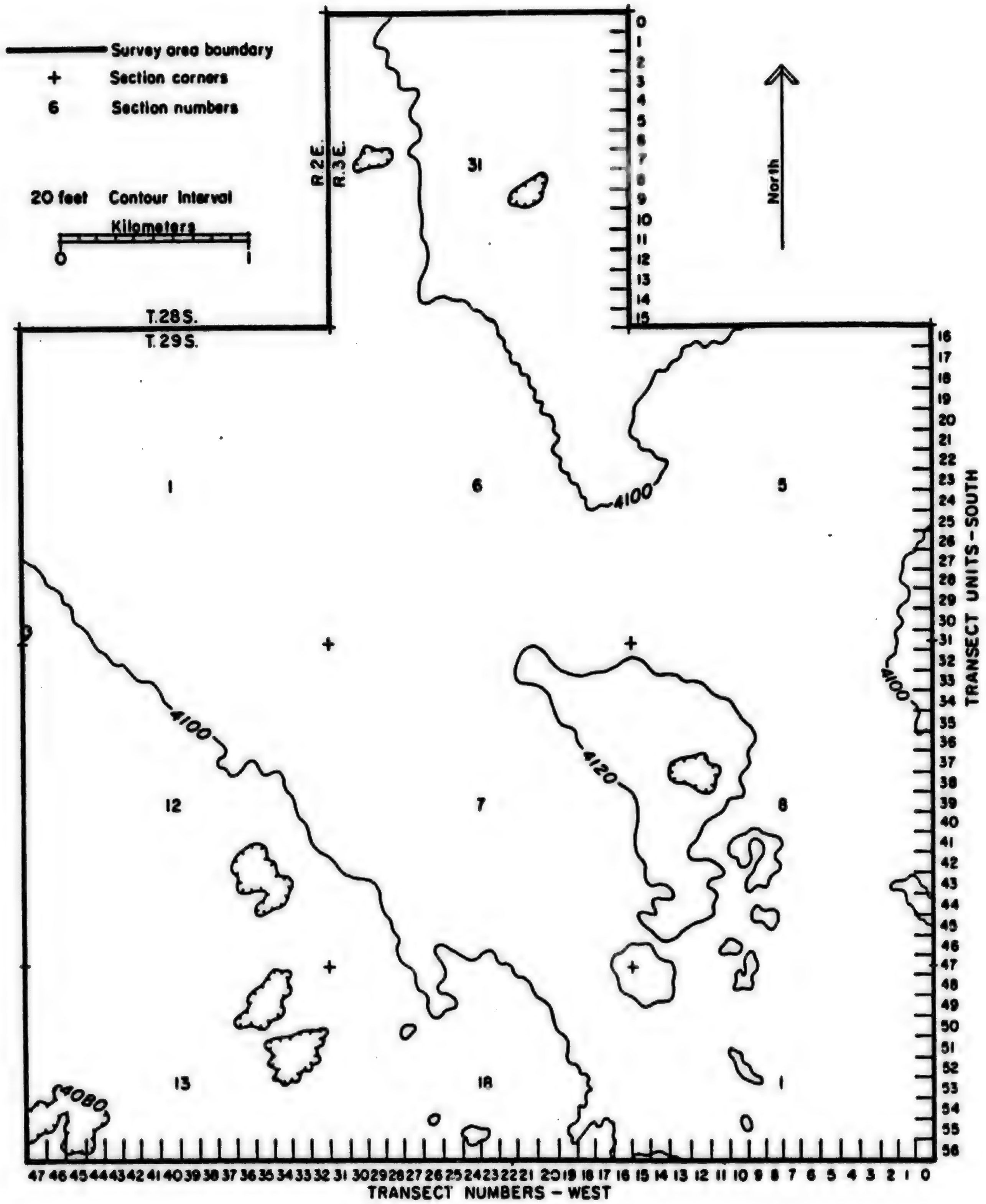

Figure 5.1. Map illustrating grid system.

Isolated Artifacts

This resource class consists of isolated artifacts (IAs) such as ceramics, ground stone, lithic debitage, chipped stone tools (for example, projectile points) and historic material.

Isolated Manifestations

Isolated manifestations (IMs) were defined as low density, but discrete, multiple artifact type surface scatters with no features. High density single artifact type scatters were also categorized as isolated manifestations as were articulated rock features that lacked associated artifactual material.

Sites

Archaeological sites were defined as any discrete resource that possessed a high density (greater than 20 items per 10-square-meter area) of multiple artifact classes. Some of these artifactual scatters possessed articulated or disarticulated rock features.

The Transect Survey forms that were formulated for the density-dependent recording and collection method represent a somewhat simplified version of the example from the Arroyo Cuervo project, which was included in the comprehensive plan (Fig. 5.2). The first page of the Transect Survey Form summarized information on locational, cultural, and environmental data, while the second page is a composite field and laboratory form. The transect survey form, although designed for use in the field, was actually completed at a later date. The Transect Grid Recording Form was formulated to record basic information at the transect unit level (Fig. 5.3). This survey form was used to record the following information: specific artifact classes and quantities of material observed, 100-square-meter grid map showing the extent of the artifactual scatter including concentrations and features when encountered, the geomorphologic zone, and the condition and deposition of sites and IMs. Laboratory of Anthropology site forms were also completed for resources classified as sites.

Survey Procedures

Archaeological survey was conducted by two seven-person field crews. Each crew consisted of a crew chief, an assistant crew chief, and five crew members. The five crew members walked each 100-square-meter transect unit in a zig-zag pattern spaced approximately 20 m apart. Blow-out areas were inspected more closely for artifacts and features.

Archaeological material observed within each 100-square-meter unit was marked with different colored pinflags based on artifact class

The information that is to be entered on this page is to be derived from three sources: 1) Blowout area and the paleosol data should be entered by the recorder while in the field. The area should be entered in square meters. A determination of the paleosol exposed in the bottom of the blowouts should be done in the field and one of the following abbreviations entered in the appropriate column below: PL= pleistocene, MH= Mid-Holocene, PU= Pueblo, CO= composite, UN= unknown, NS= no paleosol, modern sand. The total number of prehistoric and historic artifacts, etc., should be obtained from the field tallies on the mapping sheet. Densities should be figured in the laboratory as well as the distances to depressions (LECs 1c and 3c) and to the nearest different LEC. Give distances in meters.

Unit Number	BO area	Psol exp.	Number of IMs	Number of sites	Total # Preh. arts.	Total # Hist arts.	Preh. d	Hist. d	Cultural Affl.	Dist. to LEC lc/3c	Dist. to diff. LEC

Figure 5.2. Transect Survey Form

to ____________

EL PASO ARCHAEOLOGICAL PROJECT

TRANSECT SURVEY FORM

LOCATIONAL DATA

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

____ 1/4 ____ 1/4 Sec ____ T ____ R ____ County ____________ St ________

Map reference ____

Nearest named topo feature ____________________ Dist. from ________ Direct from ____

Avg. dist. from Rio Grande escarpment edge ____________ Elevation ________ to ________

CULTURAL AND ENVIRONMENTAL DATA

Cultural resources present (give numbers): ____ IAs ____ IMs ____ Sites

LEC ____________ Survey conditions: ____ Poor ____ Good ____ Excellent

Dominant plant community: ____ Grasses ____ Shrubs ____ Forbs ____ % ground cover

Dominant species ____________________ Other species present ____________

____

Comments ____

____

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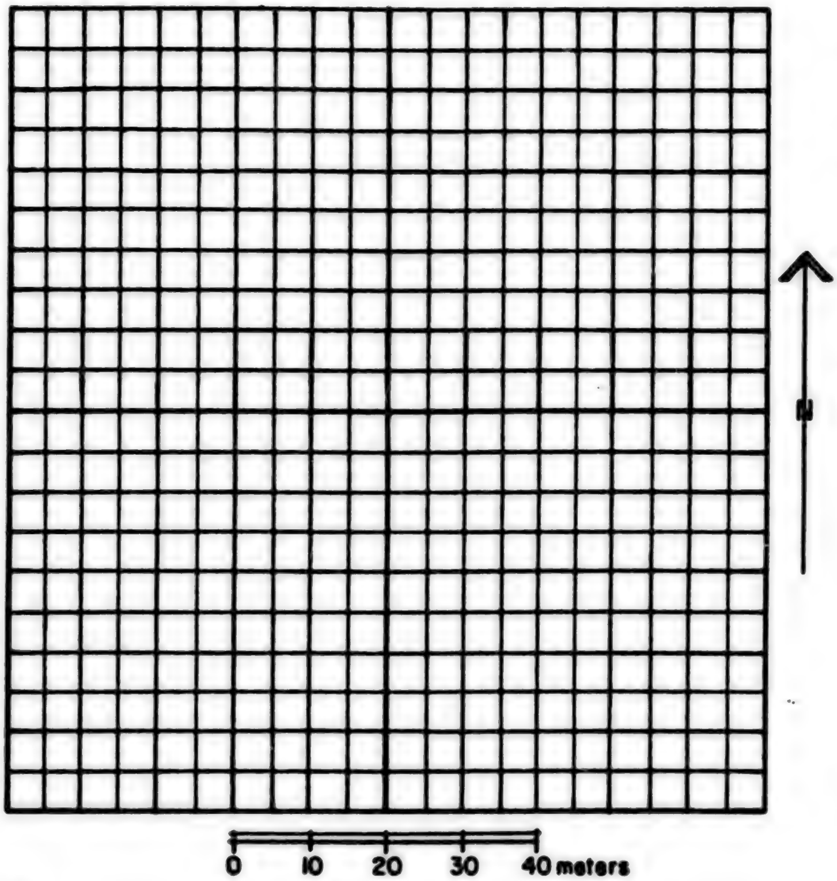
Figure 5.2. Continued.



UNIT NO. ______ **S** ______ **W**

NAME ____________________

DATE ____________________

LEC ____________________

SLOPE % ____________________

PHOTO #s ____________________

STANDARD KEY:

L	Lithics
C	Ceramics
H	Historic
GS	Ground stone
F	Fire-cracked rock
H	Hearth
☐	Site (see inset
P	Points

TALLY:

Feature	FCR	Grd. Stn.	Chpd. Stn.	Ceramics	Historic	Other	Tot. Preh.	Tot. Hist.

DEPOSITION (Sites and IMs only):

______ Stratified ______ Subsurface

______ Surface ______ Unknown

______ Unstratified

SPECIAL REMARKS:

CONDITION (Sites and IMs only):

______ Destroyed ______ Disturbed

______ Intruded ______ Undisturbed

______ Unknown ______ Partly destroyed

______ Erosion ______ Construction

______ Fire ______ Deflation

______ Grazing ______ Off road vehicles

______ Vandalism ______ Other ____________

Hicks/Beckett 9/84 #2

Figure 5.3. Transect grid unit recording form.

(Fig. 5.4). The following color designation were used: yellow for lithics, blue for ceramics, and red for fire-cracked rock and burned caliche. Upon the discovery of artifacts, crew members called out the material classes and quantity observed.

The crew member who walked the outside line laid that line using a compass if the line had not been previously marked during instrument survey. This individual also placed the southwest grid point of the transect unit by taking a compass bearing sighted on the opposite grid point (SE) that was placed by instrument survey. The southwestern point of each individual transect unit was marked by two orange pin flags.

The crew chief and assistant crew chief followed the crew members and were responsible for recording, mapping, and collecting artifacts that had been marked with pin flags (Fig. 5.5). They were assisted by crew members when sites or IMs were encountered. The determination of whether the artifactual material observed fit the criteria established for defining isolated artifacts, isolated manifestations or sites was made by the crew chief. All artifactual material observed within each 100-square-meter transect unit was recorded, mapped, collected, and counted regardless of the class of archaeological resource(s) represented. Locational control within each transect unit was maintained by pacing distances between isolated artifacts and concentrations of materials. The procedure used for mapping varied depending upon the type of archaeological resource observed. The boundaries of IMs were defined and sketched, although individual artifacts were not mapped. In contrast, sites were not only mapped but an attempt was made to record the location of all artifacts. In many instances, however, only diagnostic artifacts such as projectile points or decorated sherds were actually mapped. Sites that covered two or more 100-square-meter units were collected by individual transect unit. Isolated artifacts were collected as a single group with the exception of diagnostic items which were mapped and collected separately. Field counts of all material were made after collection and mapping was completed.

Intact features were mapped and samples were taken for flotation and radiocarbon analysis. Black and white photos were taken of each site prior to collection.

Field Laboratory

A field laboratory was established at the El Paso Archaeological Society's laboratory to conduct a preliminary analysis of the artifacts collected during the first phase of the fieldwork. An initial sort of ceramic and lithic material provided information on basic frequencies of artifact classes, density of artifact classes, the identification of diagnostic tools and large-scale morphofunctional tool classes (that is, ground stone, projectile points, bifaces, flakes), preferred raw material types, and the basic technological reduction sequence. A modified version of the preliminary Lithic Sort Dictionary formulated

Figure 5.4. Site 54.

Figure 5.5. Recording and collecting Site 46.

for the Archaic Oshara Project II was employed (see Chapter 7). The following provides a brief summary of the laboratory process.

Artifacts collected from each 100-square-meter unit were sorted as they came in from the field, with ceramic and historic artifacts being pulled for future analysis. A preliminary classification of ceramics by recognized types was completed to provide temporal and spatial information. Obsidian artifacts were also separated from each assemblage for sourcing and dating.

Phase II

The survey strategy implemented for the second phase of the project was determined on the basis of the archaeological resources encountered during the initial sample of each geomorphological zone and preliminary laboratory analysis. Two alternative strategies were originally proposed to complete the inventory, evaluation, and data recovery of the BLM parcels (Irwin-Williams and others 1984b). The first alternative consisted of inventorying all of the remaining areas of Zones 1 and 2 using the Density-Dependent Method. Furthermore, it was proposed that an additional 30 percent of Zone 3 would be examined using traditional survey techniques. This strategy, which employed both a traditional and Density-Dependent Method would be implemented if the initial 10 percent sample did not identify sites that possessed stratigraphic integrity, particularly in Zone 3. It was expected that this strategy would exhaust the information potential of the Santa Teresa cultural resources.

The second strategy entailed a 100 percent traditional survey of the remainder of Zone 3. This alternative strategy was proposed in the event that the initial sample resulted in the discovery of any resources that may have potentially possessed intact features and stratigraphic integrity. It was felt that subsurface testing to identify buried sites potentially present in Zone 3 was not necessary since natural deflation areas within the zone provided a 10 to 20 percent exposure of older deposits. This percentage of areal exposure already exceeds more intensive testing programs conducted by archaeologists in areas of low resource visibility.

The field strategy actually employed during the second phase of the project represented a modified version of the first strategy. All of the resources recorded during the initial 10 percent transect sample were located in deflation basins and lacked undisturbed stratigraphic contexts or intact features, or both. On the basis of these results, it was determined that an additional 30 percent sample of Zone 3 with collection would provide adequate coverage. The entire residual area of Zones 1 and 2 was surveyed using a traditional survey approach. In addition, in-field counts of artifacts encountered by 100-square-meter units were made for most of the remaining area of Zones 1 and 2. This was considered appropriate in view of the time constraints because a very substantial sample of continuously distributed material culture remains had already been collected from the transects.

Recording and collection procedures varied slightly from those summarized for Phase I. Diagnostic artifacts, defined as projectile points, decorated ceramics, historic materials, and ceramic rim sherds were directly mapped. The criteria used to define an archaeological site was expanded from Phase I to include high density single artifact class scatters. Therefore, some archaeological resources that were categorized as isolated manifestations during the initial 10 percent sample were considered "sites" in the second phase. This strategy was necessary in order not to bias the sample by not collecting IMs.

Chapter 6

RESULTS OF THE INVENTORY

John C. Ravesloot

As outlined in the methodology and procedures chapter, a two-phase field strategy consisting of recording both traditionally employed units (that is sites, isolated manifestations, and isolated artifacts) and 100-square-meter units using the Density-Dependent Method was implemented to provide an inventory, evaluation, and collection-mitigation of the Santa Teresa cultural resources. This chapter provides a description of the Santa Teresa archaeological resources in terms of the above traditionally recognized categories while the results of the "nonsite" analysis are presented in Chapter 11. Chronological and spatial parameters and within assemblage diversity of the resources are also discussed in this chapter.

Survey Coverage

Initially, 13 percent of the survey area was investigated by combining the recording of traditionally recognized resources (that is, sites, isolated manifestations, and isolated artifacts) with the 100-square-meter unit Density-Dependent approach. This sample consisted of transects 0W, 8W, 16W, 31W, and 47W (Fig. 6.1). The results from the inventory of these transects were used to verify the geomorphologic-based sampling procedures (see Chapter 2) and yield a minimum sample with which to compare continuous artifact distributions with traditional site locations and primary morphofunctional artifact distributions. The second phase of the inventory focused on providing a complete coverage of Zones 1 and 2 and additional sampling of Zone 3. This phase, which employed traditional techniques plus artifact counts and collection for a large number of the 100-square-meter transect units, provided information on an additional 54 percent of the survey area (Fig. 6.1). It is believed that the two-phase survey recorded all traditionally recognized resources, and provided continuous quantitative distributions of artifacts which made it possible to map activity patterns in about 87 percent of the survey area (see Chapter 11).

Description of Traditionally Recognized Resources

A total of 68 sites, 198 isolated manifestations, and hundreds of isolated artifacts were recorded and collected during the inventory of the Santa Teresa parcels. Each of these resource classes are described below.

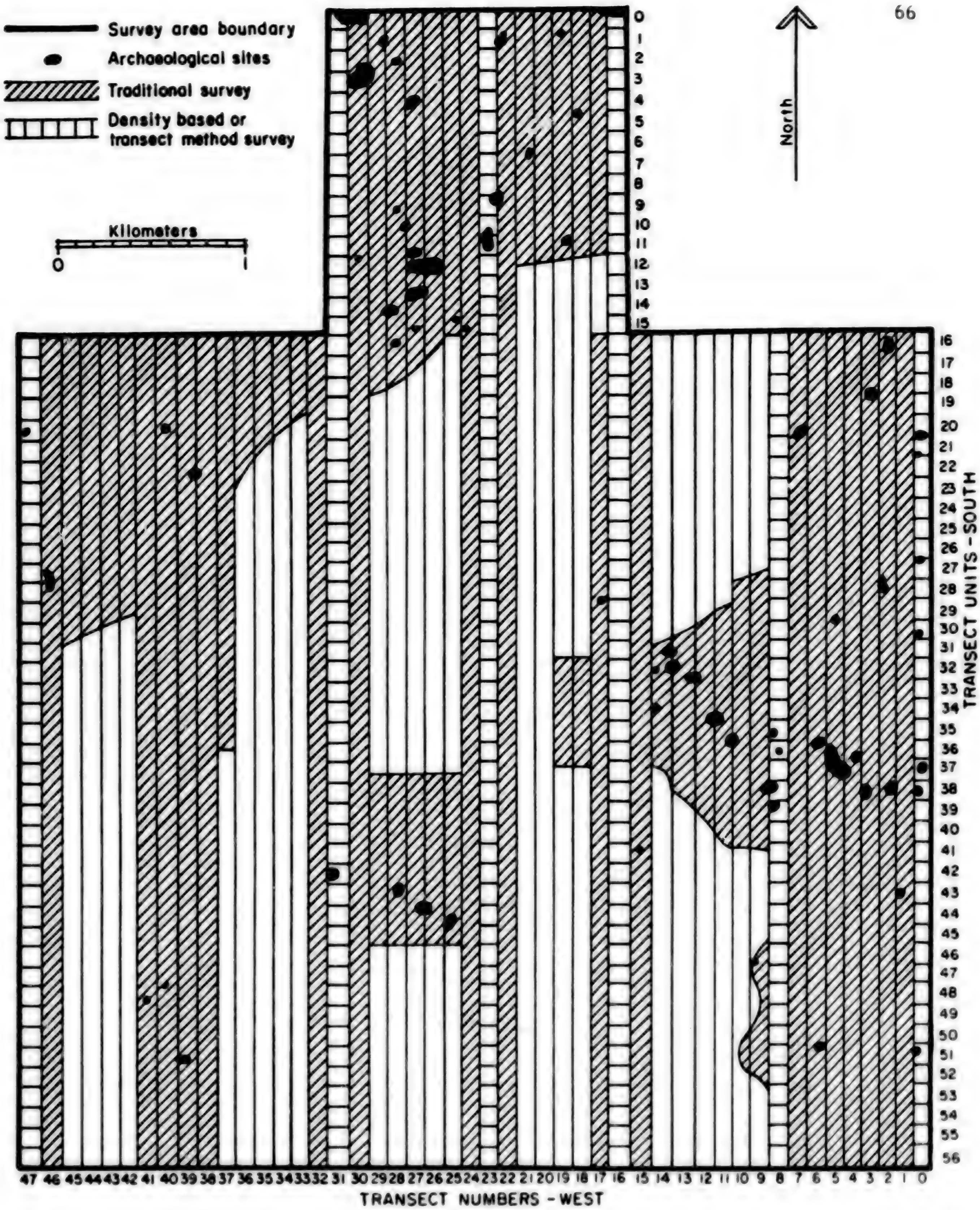


Figure 6.1. Project area surveyed by the density dependent and traditional methods.

Sites

Sixty-eight artifact scatters were recorded as sites during the course of the inventory. All of the sites are presumed to represent temporary or "limited-activity" procurement and processing locales. The artifact assemblages most commonly associated with these scatters consisted of variable amounts of undecorated brown ware pottery, indeterminate fragments of ground stone, which were often fire cracked, chipped stone debitage, and burned caliche. Occasionally, formal chipped stone tools, decorated ceramics, and articulated features composed of fire-cracked rock and burned caliche were present. Nevertheless, there was considerable variability in the size, density, and diversity of the artifactual material recorded and collected. Table 6.1 provides a description of each site in terms of type, size, transect location, geomorphological zone, condition, associated features, temporal period, function, and evaluation. Sketch maps for each of these sites are provided in Appendix A (Figs. A.1 through A.68).

Site Size

The sites range in size from 10 square meters (Fig. A.18, LA 49334) to 22,800 square meters (Fig. A.41, LA 49357). This variability is presumed to be a function of the range of activities performed at each locale and their repeated use on a seasonal basis. Site size estimates, while providing some information on the spatial distribution of scatters, are not considered very meaningful since the majority of these were identified as a result of deflation. In most instances, it is possible and highly probable that an area equal or larger than that defined was not visible because it remained covered by recent and older dune accumulations. In some portions of the survey area, particularly in the vicinity of the playas, it is conceivable that removal of dune accumulations down to the underlying Pleistocene surface would result in the discovery of artifactual scatters that were almost continuous for the entire area.

In restrospect, several of the scatters (for example, LA 49324 and LA 49334) should have been categorized as isolated manifestations rather than sites. The management requirements of the BLM necessitated the employment of the concept of a site during the inventory. Unfortunately, during the initial stages of the inventory the site concept as defined for this project (see Chapter 5) was inconsistently applied by the two survey crews. Ideally, sites should have been defined following the actual survey rather than in the field.

Features

Small hearths or roasting pits are indicated by scattered and clustered lumps of burned caliche associated with 20 of the artifact scatters. Ocassionally, fire-cracked rock, usually in the form of recycled ground stone, was found incorporated in these features. In most cases, these features were deflated to such an extent that

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Table 6.1

DESCRIPTIONS OF SANTA TERESA SITES

LA No.	Site Type	Size (m^2)	Location	Zone	Condition	Features	Temporal Period	Function	Evaluation
49317	Ceramic-lithic scatter	369	20S/0W	1A	Deflated	FCR/BC	A, MC	Processing-procurement	Discharged use
49318	Ceramic-lithic scatter	525	21S/0W	1A	Deflated	FCR/BC	M	Processing-procurement	Discharged use
49319	Lithic scatter	150	27S/0W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49320	Lithic scatter	60	30W/0W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49321	Ceramic-lithic scatter	2,025	37S/0W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49322	Lithic scatter	3,000	38S/0W/S	1A	Deflated	1ARF	Phase unknown	Processing-procurement	Discharged use
49323	Ceramic-lithic scatter	6,650	51-52A/0W	1A	Deflated	FCR/BC	M	Processing-procurement	Discharged use
49324	Ceramic-lithic scatter	19	21S/47W	1B	Deflated	1ARF	Phase unknown	Processing-procurement	Discharged use
49325	Ceramic-lithic scatter	416	26-27S/46W	1B	Deflated	1ARF	M	Processing-procurement	Discharged use
49326	Ceramic-lithic scatter	3,300	48S/41W	3	Deflated	1ARF 2 DRF	Phase unknown	Processing-procurement	Discharged use
49327	Ceramic-lithic scatter	7,000	22-23S/38-39W	2	Deflated	None	M	Processing-procurement	Discharged use
49328	Ceramic-lithic scatter	770	20S/40W	1A	Deflated	FCR/BC	A, Phase unknown	Processing-procurement	Discharged use
49329	Ceramic-lithic scatter	900	43S/31W	3E-1A	Deflated	FCR/BC	M	Processing-procurement	Discharged use
49330	Ceramic-lithic scatter	1,125	15S/24W	3A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49331	Ceramic-lithic scatter	700	41S/15W	3B	Deflated	None	M	Processing-procurement	Discharged use
49332	Ceramic-lithic scatter	525	29S/17W	3B	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49333	Ceramic-lithic scatter	750	0S/17W	1D	Deflated	1ARF 2DRF	Phase unknown	Processing-procurement	Discharged use
49334	Ceramic-lithic scatter	10	5S/18W	1A	Deflated	FCR/BC 1HS	MC	Processing-procurement	Discharged use
49335	Ceramic-lithic scatter	12	02S/19W	1A	Deflated	FCR/BC	EP	Processing-procurement	Discharged use
49336	Ceramic-lithic scatter	13,500	0S/30-31W	1A	Deflated	3DRF 3ARF	Phase unknown	Processing-procurement	Discharged use
49337	Lithic scatter	1,200	11S/19W	1A	Deflated	FCR/BC	A, M	Processing-procurement	Discharged use
49338	Lithic scatter	3,025	12S/30W	1A	Deflated	FCR/BC	A, Phase unknown	Processing-procurement	Discharged use
49339	Ceramic-lithic scatter	22,400	4-5S/30W	1A	Deflated	7DRF 6ARF	M	Processing-procurement	Discharged use
49340	Ceramic-lithic scatter	3,500	0-1S/22-23W	1B	Deflated	2DRF 1ARF	A, M	Processing-procurement	Discharged use
49341	Ceramic-lithic scatter	1,650	9S/22-23W	1C	Deflated	FCR/BC 1ARF	EP	Processing-procurement	Discharged use
49342	Ceramic-lithic scatter	44	10-11S/23W	1C	Deflated	2DRF	MC	Processing-procurement	Discharged use

Table 6.1, continued

DESCRIPTIONS OF SANTA TERESA SITES

LA No.	Site Type	Size (m^2)	Location	Zone	Condition	Features	Temporal Period	Function	Evaluation
49343	Ceramic-lithic scatter	1,000	10S/27-28W	1A	Deflated	FCR/BC	A, M	Processing-procurement	Discharged use
49344	Ceramic-lithic scatter	3,825	7S/21W	1C	Deflated	1HS	M, EP	Processing-procurement	Discharged use
49345	Ceramic-lithic scatter	4,125	9-10S/28-29W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49346	Ceramic-lithic scatter	2,975	43S/28W	1B-3C	Deflated	2DRF	M, EP	Processing-procurement	Discharged use
49347	Ceramic-lithic scatter	3,600	3S/28W	1C	Deflated	FCR/BC	A, MC	Processing-procurement	Discharged use
49348	Ceramic-lithic scatter	5,625	43-44S/26-27W	1B-3C	Deflated	1ARF	Phase unknown	Processing-procurement	Discharged use
49349	Ceramic-lithic scatter	2,400	2S/28-29W	1C	Deflated	FCR/BC 1DRF	A, Phase unknown	Processing-procurement	Discharged use
49350	Ceramic-lithic scatter	1,596	45S/25W	1B-3C	Deflated	FC/BC	MC	Processing-procurement	Discharged use
49351	Lithic scatter	5,500	13-14S/26-27W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49352	Ceramic-lithic scatter	4,320	16-17S/2W	1B	Deflated	FCR/BC	A, MC	Processing-procurement	Discharged use
49353	Ceramic-lithic scatter	4,200	4-5S/27W	1A	Deflated	FCR/BC	P, M, EP	Processing-procurement	Discharged use
49354	Lithic scatter	8,000	28-29S/2W	1A	Deflated	1DRF 1HS	Phase unknown	Processing-procurement	Discharged use
49355	Ceramic-lithic scatter	1,950	11S/27W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49356	Ceramic-lithic scatter	2,600	15S/25W	1A	Deflated	FCR/BC	M, EP	Processing-procurement	Discharged use
49357	Ceramic-lithic scatter	22,800	11-12S/26-27W	1A	Deflated	2HS	A, MC	Processing-procurement	Discharged use
49358	Ceramic-lithic scatter	11,050	14S/29W	1A	Deflated	FCR/BC	A, Phase unknown	Processing-procurement	Discharged use
49359	Ceramic-lithic scatter	1,575	15-16S/27W	1A	Deflated	FCR/BC	MC	Processing-procurement	Discharged use
49360	Ceramic-lithic scatter	700	16S/28W	1A	Deflated	FCR/BC	M, EP	Processing-procurement	Discharged use
49361	Lithic scatter	3,500	37-38S/3W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49362	Ceramic-lithic scatter	2,000	20S/3W	1B	Deflated	None	M	Processing-procurement	Discharged use
49363	Lithic scatter	3,025	30S/5-6W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49364	Ceramic-lithic scatter	15,725	37S/4-5W	1A	Deflated	2HS 1DRF	A, M	Processing-procurement	Discharged use
49365	Lithic scatter	800	36S/4W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49366	Ceramic-lithic scatter	4,940	10S/7W	1B	Deflated	1DRF	Phase unknown	Processing-procurement	Discharged use
49367	Ceramic-lithic scatter	484	48S/40W	3D	Deflated	1ARF	Phase unknown	Processing-procurement	Discharged use
49368	Ceramic-lithic scatter	345	47S/9W	1B	Deflated	FCR/BC	M	Processing-procurement	Discharged use
49369	Ceramic-lithic scatter	7,475	43-44S/1W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use

Table 6.1, continued

DESCRIPTIONS OF SANTA TERESA SITES

LA No.	Site Type	Size (m^2)	Location	Zone	Condition	Features	Temporal Period	Function	Evaluation
49370	Ceramic-lithic scatter	400	34S/14W	1B	Deflated	FCR/1HS	Phase unknown	Processing-procurement	Discharged use
49371	Ceramic-lithic scatter	400	52S/39W	3D	Deflated	3DRF	Phase unknown	Processing-procurement	Discharged use
49372	Ceramic-lithic scatter	5,600	32-33S/13-14W	1B	Deflated	FCR/3HS	A, Phase unknown	Processing-procurement	Discharged use
49374	Ceramic-lithic scatter	225	32S/14W	2B	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49376	Ceramic-lithic scatter	3,000	51S/6W	1B	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49377	Lithic scatter	3,120	36S/6W	1A	Deflated	FCR/BC	EP	Processing-procurement	Discharged use
49378	Lithic scatter	2,704	39S/8W	1A/1B	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49379	Ceramic-lithic scatter	8,112	38S/8W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49380	Lithic scatter	100	16S/8W	1A	Deflated	FCR/BC 1ARF	Phase unknown	Processing-procurement	Discharged use
49381	Ceramic-lithic scatter	4,900	35S/8W	1A	Deflated	FCR/BC 1ARF	M	Processing-procurement	Discharged use
49382	Ceramic-lithic scatter	6,000	35-36S/10-11W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49383	Lithic scatter	1,875	34-35S/11W	1A	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49384	Ceramic-lithic scatter	2,940	33S/12-13W	1B	Deflated	FCR/BC	Phase unknown	Processing-procurement	Discharged use
49385	Ceramic-lithic scatter	2,849	31S/13-14W	1B/3B	Deflated	FCR/BC 1ARF	A, M	Processing-procurement	Discharged use
49386	Ceramic-lithic scatter	4,550	38S/2W	1A	Deflated	FCR/BC	M	Processing-procurement	Discharged use

FCR/BC = Fire-cracked rock/burned caliche
ARF = Articulated rock feature
DRF = Disarticulated rock feature
HS = Hearth stain

A = Archaic
M = Mesilla
MC = Mixed Ceramic
EP = El Paso
P = Paleo

relatively little or no carbonaceous soil remained. The disarticulated nature of many of these features is apparently the result of cultural and natural erosional processes. Variability in the size of these features is believed to be related to their repeated use on a seasonal basis.

A total of 45 burned caliche and fire-cracked rock features were identified (Table 6.1). Disarticulated and articulated features are equally represented. Nineteen of these features were recorded at LA 49336 (Fig. A.20) and LA 49339 (Fig. A.23). For example, LA 49339, one of the largest artifact scatters recorded, contained seven disarticulated and six articulated concentrations of burned caliche and fire-cracked rock. Scattered pieces of burned caliche and fire-cracked rock were encountered at all but 5 of the sites and 38 of the IMs. In addition to the burned caliche and fire-cracked rock features, hearth stains were recorded at five of the sites. Hearth stains were also very shallow, due to deflation, and lacked associated fire-cracked rock and burned caliche.

Burned caliche and fire-cracked rock hearths and hearth stains are presumed to represent special purpose facilities used in the processing of various seasonal plant resources such as soaptree yucca. Similar features have been recorded through the El Paso area, particularly in the lowlands of the Hueco and Mesilla bolsons away from the Rio Grande River (Hard 1983; O'Laughlin 1980; Whalen 1978).

Flotation samples recovered from 20 of these features were analyzed in an attempt to determine the plant resources that were processed in them during prehistoric times (O'Laughlin, Chapter 9). Only five carbonized seeds were identified from the 20 flotation samples analyzed. Two of the seeds were identified as goose-foot/pigweed (Chenopodium Amaranthus) while the remaining three were unidentifiable. This poor preservation of carbonized plant materials was not unexpected since the samples were recovered from surface features that experienced deflation by wind erosion.

The repeated use of these features makes it very difficult to discuss their temporal distribution within the survey area. Radiocarbon analyses of wood charcoal samples recovered from four of these features indicates their use from Archaic through historic times (chronology discussion, this chapter).

Distribution of Sites by Geomorphologic Zones

Figure 6.2 shows the distribution of recorded sites by the three major geomorphologic and nine subzones defined for the survey area. As predicted, almost all the sites were encountered in Zone 1 (high visibility and low integrity), whereas those sites located in Zone 3 were identified because of deflation, which improved visibility.

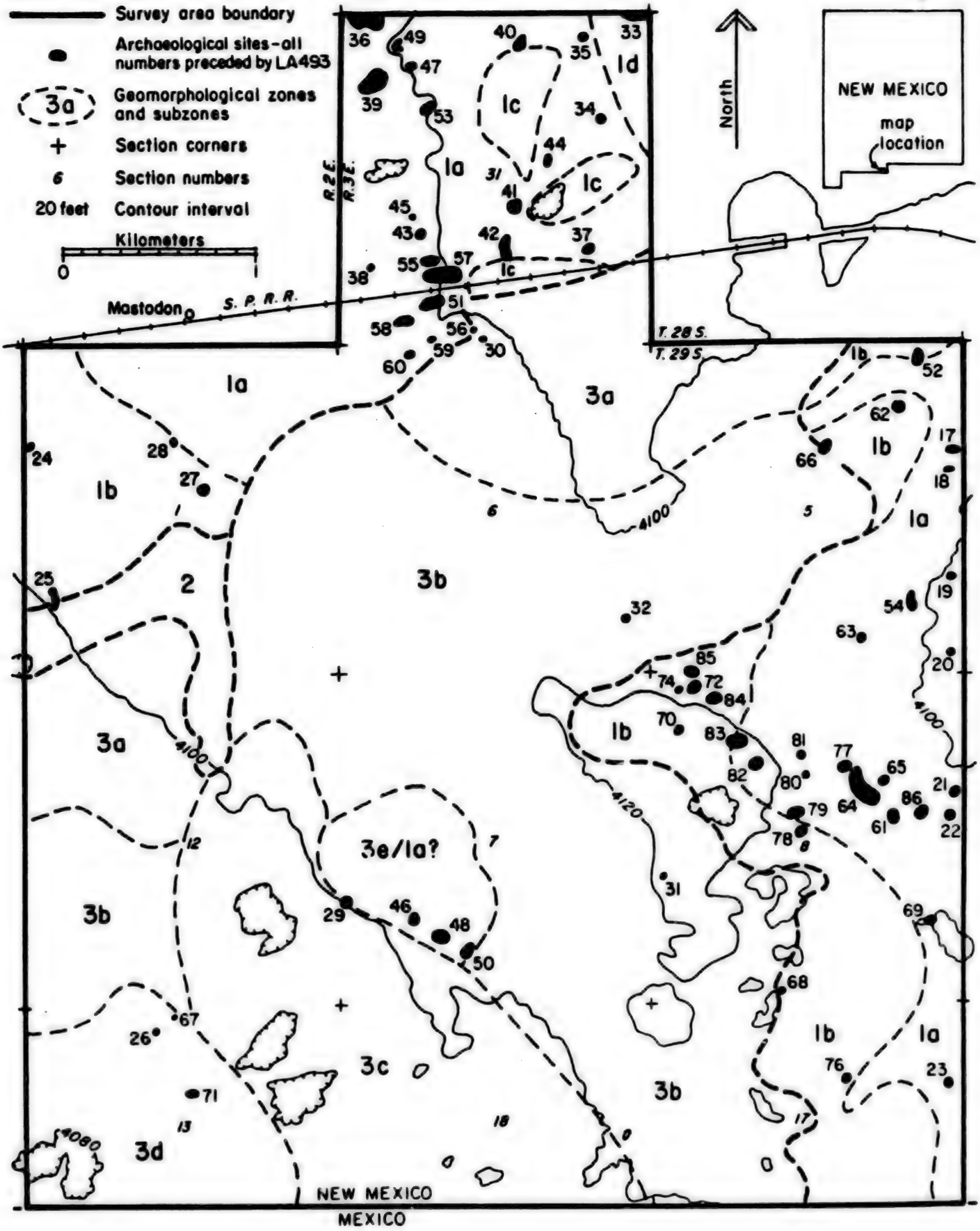

Figure 6.2. Distribution of sites within the project area.

Isolated Manifestations and Isolated Artifacts

Isolated manifestations (IMs) are defined in Chapter 5 as low density but discrete, multiple-artifact-type surface scatters with no associated features. Single-artifact-type scatters and articulated fire-cracked rock features that lacked associated artifactual material were also included within this resource category. This resource unit, as well as those defined as sites, presumably represents the remains of temporary or "limited-activity" locales. Table 6.2 provides a description of each IM in terms of material classes present, size, transect location, geomorphologic zone, associated fire-cracked rock, condition, and temporal components. Specific locations of IMs in transect units and sketch maps are not provided in this report but are available upon request from the Las Cruces District, BLM. Isolated artifacts that were recovered during the inventory consist primarily of projectile points and other chipped stone tools and decorated and El Paso Brown rim sherds. A listing of this material is also available upon request. The isolated historic artifacts collected are described in Chapter 10.

Chronology

An important objective of the Santa Teresa Project was the investigation of changing patterns of prehistoric land use. This objective necessitated the development of a relative temporal ordering of the project area's resources. Precise temporal placement of these resources was complicated by the fact that all the materials recorded were surface remains that represented single and multiple uses of selected locales related to processing and procurement activities. In addition, temporal ordering of the Santa Teresa assemblages was complicated by the lack of diagnostic materials (such as decorated ceramics and projectile points) and geomorphic processes that resulted in the mixing of assemblages. Nevertheless, an attempt was made to identify all temporal components represented within an assemblage. With the exception of Carmichael (1982a), relatively few survey projects recently completed within the vicinity of the study area have adequately addressed the problem of identifying multiple reoccupations of sites. Obviously, this problem must be considered when dealing with surface assemblages if we hope to provide a complete and accurate picture of changing land use patterns in the area.

The Santa Teresa study utilized several different techniques to identify temporal components and produce a relative temporal ordering of the cultural resources. These included: ceramic cross dating, projectile point typology, variability in the rim forms of local brown ware ceramics, and the relative diversity of the raw material types of the lithic assemblages. Radiocarbon and obsidian hydration dating methods were employed to evaluate the phase assignments made on the basis of the above relative dating techniques.

Table 6.2

DESCRIPTION OF ISOLATED MANIFESTATIONS

Transect Unit	Resource Type	Size (M^2)	IM No.	Zone	Condition	Feature	Temporal Components
16S/0W	Ceramic scatter	80	1	1A	Deflated		Phase unknown
16S/0W	Ceramic scatter	176	2	1A	Deflated		Phase unknown
17S/0W	Ceramic-lithic scatter	81	1	1A	Deflated	FCR/BC	Mesilla
17S/0W	Lithic scatter	48	2	1A	Deflated		Phase unknown
20S/0W	Ceramic-lithic scatter	260	1	1A	Deflated		Phase unknown
21S/0W	Ceramic-lithic scatter		1	?	Deflated		Mesilla
22S/0W	Ceramic-lithic scatter	660	1	1A	Deflated		Phase unknown
24S/0W	Lithic scatter	60	1	1A	Deflated		Phase unknown
24S/0W	Ceramic-lithic scatter	2,124	2	1A	Deflated		Phase unknown
26S/0W	Lithic scatter	550	1	1A	Deflated		Phase unknown
26S/0W	Lithic scatter	6	2	1A	Deflated		Phase unknown
26S/0W	Ceramic-lithic scatter	160	3	1A	Deflated		Phase unknown
27S/0W	Ceramic-lithic scatter		1	?	Deflated		Phase unknown
31S/0W	Lithic scatter	1,188	1	1A	Deflated		Phase unknown
33S/0W	Ceramic-lithic scatter	500	1	1A	Deflated		El Paso?
34S/0W	Ceramic-lithic scatter	30	1	1A	Deflated	FCR/BC	Phase unknown
34S/0W	Lithic scatter	88	2	1A	Deflated		Phase unknown
35S/0W	Lithic scatter	338	1	1A	Deflated		Phase unknown
37S/0W	Lithic scatter		1	?	Deflated		Phase unknown
37S/0W	Ceramic-lithic scatter		2	?	Deflated		Phase unknown
37S/0W	Lithic scatter		3	?	Deflated		Phase unknown
37S/0W	Lithic scatter		4	?	Deflated		Phase unknown
39S/0W	Lithic scatter	18	1	1A	Deflated	FCR/BC	Archaic
40S/0W	Lithic scatter	1,710	1	1A	Deflated	FCR/BC	Archaic
42S/0W	Lithic scatter	55	1	1A	Deflated		Phase unknown
42S/0W	Lithic scatter	120	2	1A	Deflated		Phase unknown
43S/0W	Ceramic scatter	30	1	1A	Deflated	FCR/BC	Phase unknown
44S/0W	Ceramic-lithic scatter	896	1	1A	Deflated		Phase unknown
44S/0W	Ceramic-lithic scatter	1,840	2	1A	Deflated		Phase unknown
45S/0W	Ceramic scatter	273	1	1A	Deflated		Phase unknown
45S/0W	Ceramic-lithic scatter	484	2	1A	Deflated		Mesilla
47S/0W	Lithic scatter	513	1	1A	Deflated		Phase unknown
48S/0W	Lithic scatter	1,817	1	1A	Deflated		Phase unknown
48S/0W	Ceramic-lithic scatter	800	3	1A	Deflated		Phase unknown
49S/0W	Lithic scatter	336	1	1A	Deflated	FCR/BC	Phase unknown
50S/0W	Lithic scatter	117	1	?	Deflated		Phase unknown
50S/0W	Lithic scatter	64	2	?	Deflated		Phase unknown
54S/0W	Lithic scatter	2,394	1	1A	Deflated	FCR/BC	Phase unknown
55S/0W	Lithic scatter	56	1	1A	Deflated	FCR/BC	Phase unknown
55S/0W	Lithic scatter	100	2	1A	Deflated	FCR/BC	Phase unknown
56S/0W	Lithic scatter	192	1	1A	Deflated	FCR/BC	Phase unknown
56S/0W	Lithic scatter	322	2	1A	Deflated	FCR/BC	Phase unknown
19S/8W	Ceramic scatter	154	1	3A	Deflated		El Paso

Table 6.2, continued

DESCRIPTION OF ISOLATED MANIFESTATIONS

Transect Unit	Resource Type	Size (M^2)	IM No.	Zone	Condition	Feature	Temporal Components
30S/8W	Ceramic-lithic scatter	312	1	1A	Deflated	FCr/BC	Phase unknown
32S/8W	Ceramic scatter	280	1	1A	Deflated		Phase unknown
37S/8W	Ceramic-lithic scatter	252	1	1A	Deflated	FCR/BC	Phase unknown
37S/8W	Lithic scatter	192	2	1A	Deflated	FCR/BC	Phase unknown
38S/8W	Ceramic scatter		1?	?	Deflated		Phase unknown
53S/8W	Ceramic scatter	72	1	3B/1B	Deflated	FCR/BC	Mixed Ceramic
54S/8W	Ceramic-lithic scatter	165	1	3B	Deflated	FCR/BC	Phase unknown
55S/8W	Ceramic-lithic scatter	722	1	1B	Deflated	FCR/BC	Phase unknown
55S/8W	Ceramic-lithic scatter	140	2	1B	Deflated	FCR/BC	Mesilla
0S/16W	Lithic scatter				Deflated		Phase unknown
07S/16W	Ceramic-lithic scatter	323	1	1A	Deflated	FCR/BC	Mixed Ceramic
10S/16W	Lithic scatter	208	1	1A	Deflated		Phase unknown
32S/16W	Ceramic-lithic scatter	194	1	3B	Deflated		Mixed Ceramic
34S/16W	Lithic scatter	210	1	1B	Deflated	FCR/BC	Phase unknown
0S/23W	Lithic scatter	100	1	1A	Deflated	FCR/BC	Phase unknown
0S/23W	Lithic scatter	143	2	1A	Deflated	FCR/BC	Phase unknown
5S/23W	Ceramic-lithic scatter	120	1	1B	Deflated		Phase unknown
10S/23W	Ceramic-lithic scatter		1		Deflated		Mesilla
12S/23W	Ceramic-lithic scatter	300	1	1C	Deflated		Archaic
15S/23W	Ceramic-lithic scatter	90	1	3A	Deflated		Phase unknown
31S/23W	Lithic scatter	25	1	3B	Deflated		Phase unknown
32S/23W	Ceramic-lithic scatter	25	1	3B	Deflated	FCR/BC	Phase unknown
32S/23W	Ceramic-lithic scatter	24	2	3B	Deflated	FCR/BC	Phase unknown
47S/23W	Ceramic scatter	112	1	3B	Deflated	FCR/BC	Mesilla
03S/31W	Lithic scatter	100	1	1A	Deflated	FCR/BC	Phase unknown
5S/31W	Lithic scatter	168	1	1A	Deflated	FCR/BC	Archaic
7S/31W	Lithic scatter	242	1	1A	Deflated	FCR/BC	Phase unknown
9S/31W	Lithic scatter	96	1	1A	Deflated	FCR/BC	Phase unknown
10S/31W	Lithic scatter	160	1	1A	Deflated	FCR/BC	Phase unknown
10S/31W	Lithic scatter	72	2	1A	Deflated	FCR/BC	Phase unknown
14S/31W	Lithic scatter	192	1	1A	Deflated		Phase unknown
34S/31W	Ceramic-lithic scatter	16	1	3B	Deflated		Phase unknown
40S/31W	Ceramic-lithic scatter	153	1	3E-1A	Deflated	FCR/BC	Mesilla
40S/31W	Ceramic-lithic scatter	48	2	3E-1A	Deflated	FCR/BC	Phase unknown
40S/31W	Ceramic-lithic scatter	56	3	3E-1A	Deflated	FCR/BC	Phase unknown
41S/31W	Sherd-lithic scatter	56	1	3E-1A	Deflated		Phase unknown
41S/31W	Ceramic-lithic scatter	121	2	3E-1A	Deflated		Phase unknown
42S/31W	Ceramic-lithic scatter	42	1	3E-1A	Deflated		Mesilla
25S/32W	Lithic scatter	81	1	1B	Deflated		Phase unknown
17S/46W	Lithic scatter		1		Deflated		Phase unknown
18S/46W	Lithic scatter		1		Deflated		Phase unknown
19S/46W	Ceramic-lithic scatter	24	1	1B	Deflated	FCR/BC	Mesilla
25S/46W	Lithic scatter		1		Deflated		Phase unknown

Table 6.2, continued

DESCRIPTION OF ISOLATED MANIFESTATIONS

Transect Unit	Resource Type	Size (M^2)	IM No.	Zone	Condition	Feature	Temporal Components
25S/46W	Ceramic-lithic scatter	35	2	1B	Deflated	FCR/BC	Phase unknown
26S/46W	Ceramic-lithic scatter	72	1	1B	Deflated	FCR/BC	Mesilla
27S/46W	Ceramic-lithic scatter		1		Deflated		Phase unknown
24S/47W	Lithic scatter	288	1	1B	Deflated		Phase unknown
26S/47W	Ceramic scatter	77	1	1B	Deflated		Phase unknown
28S/47W	Ceramic-lithic scatter	64	1	1B	Deflated	FCR/BC	Phase unknown
29S/47W	Ceramic scatter	81	1	2	Deflated		Phase unknown
43S/47W	Ceramic-lithic scatter	429	1	3B	Deflated	FCR/BC	Mesilla
50S/47W	Ceramic scatter	77	1	3D	Deflated		Mesilla

FCR/BC = Fire-cracked rock/burned caliche

Ceramic Cross-Dating

Ceramic types identified for the Jornada Branch of the Mogollon have been grouped into phases (that is, Mesilla, Dona Ana, and El Paso) by Lehmer (1948; see Chapters 3 and 8). An attempt was made to identify specific ceramic phase components on the basis of the presence and absence of types associated with these phases. The small size and weathered condition of most of the assemblages and the predominance of unspecific (that is, nonrim) brown ware made it very difficult to identify phase specific components. Ceramic assemblages that consisted solely of unspecific brown were classified as phase unknown. Mesilla phase components were identified by the co-occurrence of El Paso Brown and unspecific brown, and/or unspecific brown and El Paso Bichrome varieties. Assemblages that contained El Paso Brown, El Paso Bichrome, Mimbres Classic Black-on-white, Three Rivers Red-on-terracotta, and Playas Red are classified as mixed ceramic, and included both Mesilla and Dona Ana components. This designation was necessary due to the difficulty of identifying Dona Ana phase components. The El Paso phase was defined primarily by the presence of El Paso Polychrome.

Variability in the shape of El Paso Brown rim sherds was also examined in an attempt to refine the temporal placement of the Santa Teresa resources (Crown, Chapter 8). The rim sherd sample recovered was determined to be too small to conduct a meaningful study.

Projectile Point Associations

Inventory and collection of the Santa Teresa land parcels resulted in the recovery of 101 projectile points. A description of each of these points is available in Chapter 7. Thirty-seven of these points could be assigned with some confidence to relative temporal periods on the basis of typologies formulated for adjacent regions. Temporally sensitive point types identified included Augustin, Chiricahua, Pelona, Shumla, San Pedro, Pueblo side-notched, Maljamar, Folsom, and several Oshara-like points. The spatial distribution and relative temporal placement of these types is presented in Table 6.3.

Temporal Components

A relative chronological ordering of the Santa Teresa cultural resources on the basis of decorated ceramics and diagnostic projectile points resulted in the identification of 73 datable components (Table 6.4). One hundred eleven localities lacked diagnostic artifacts and could not be temporally placed. The datable components ranged from Paleo-Indian through the later formative periods. Several locations such as LA 49353 were found to possess multiple mixed components (that is, Paleo-Indian, Mesilla, and El Paso; Table 6.1). It is assumed that these mixed assemblages represent reuse of locales rather than the curation of earlier material by later prehistoric groups.

Relative dated temporal components suggest that there may have been a more intensive use of the project area during the Archaic and early formative periods than at other times during the cultural historical sequence (Table 6.4). Evidence for an earlier use of the project area is based upon the recovery of a single fragment of a Folsom point, which suggests a limited use of the area during this period. However, this picture may not be entirely accurate due to the amount of point collecting that has occurred in the area. There also appears to be less evidence of El Paso phase (A.D. 1200 to 1400) use than during the earlier Mesilla phase. Once again, it is questionable whether this difference in intensity of use is really a reflection of prehistoric activities or is simply related to the problems of making fine chronological distinctions with surface ceramic assemblages when decorated sherds are absent. Sixty-five surface scatters had associated ceramic components which were temporally unclassifiable because an unspecific brown ware was the only type identified. It is highly probable that additional El Paso phase components are present which have not been identified.

The validity of these temporal identifications are tenuous at best, since they are for the most part based upon relatively few diagnostics. Preceramic components, for example, were in all but one instance (LA 49338) recognized by the presence of a single Archaic type point. In addition, many of the ceramic period loci and preceramic components for that matter may represent multiple uses within the temporal designations assigned on the basis of relative dating. The

Table 6.3

TEMPORALLY SENSITIVE POINT TYPES

Temporal Period	Point Type	Field Number	Location	
Paleo-Indian	Folsom	279	LA 49353	04S/27W
Early Archaic	Jay	318	IM #1	05S/31W
Middle Archaic	San Jose	196	IA	05S/31W
	Armijo	310	LA 49338	12S/30W
	Augustin	318(1)	IA	05S/31W
	Augustin	310	LA 49338	12S/30W
	Chiricahua	051	IA	31S/0W
	Chiricahua	301	LA 49349	02S/29W
	Chiricahua	255	IA	12S/24W
	Chiricahua	295(1)	LA 49343	10S/38W
	Chiricahua	440	LA 49337	11S/19W
	Chiricahua	005	LA 49317	20S/0W
	Chiricahua	025	IM #1	40S/0W
	Pelona	303(6)	LA 49358	14S/29W
	Pelona	042	IA	56S/0W
	Pelona	283	LA 49357	12S/27W
	Pelona	228	IM #1	12S/23W
	Pelona	318	IA	05S/31W
	Pelona	366	LA 49328	20S/40W
	Pelona	022	IA	37S/0W
	Shumla	125(3)	LA 49354B	29S/02W
	Shumla	125	IA	57S/08W
	Shumla	053	IA	45S/02W
Late Archaic-Early Formative	San Pedro	2273	IA	32S/10W
	San Pedro	076	IA	32S/06W
	San Pedro	298-303	LA 49359	14S/28-29W
	San Pedro	295	LA 49343	10S/29W
	San Pedro	391	IA	20S/47W
	San Pedro	070(1)	LA 49364	37S/05W
	San Pedro	070(3)	LA 49364	37S/05W
	San Pedro	140	LA 49372	32S/13W
	San Pedro	180	IA	08S/17W
	Pueblo side-notched	258	IA	57S/24W
	Pueblo side-notched	344	IA	45S/31W

Table 6.4

DISTRIBUTION OF TEMPORAL COMPONENTS

	Sites	IMs
Paleo-Indian	1	
Archaic	15	4
Mesilla	20	12
Mixed Ceramic	8	3
El Paso	8	2
Phase unknown	37	74
Total	89	95

remainder of the chronology discussion presents the results of the radiocarbon and obsidian hydration studies and evaluates the chronological ordering developed on the basis of diagnostic artifacts.

Obsidian Hydration Dating

Fourteen obsidian projectile points were submitted to MOHLAB, State College, Pennsylvania for hydration rates, source affinity tests, and calendar dates. Projectile points, rather than other artifact types, were submitted in an attempt to provide absolute calendar dates for some of the recognized styles that have been relatively dated and used to assign temporal components. Hydration rates were determined by MOHLAB for each chemically distinct obsidian source by experimentally inducing hydration. The obsidian hydration dating method, particularly the induced hydration technique, has been summarized by Michaels and others (1980, 1983a, 1983b). Therefore, a summary of the technique will not be provided here.

Obsidian analysis provided hydration rates, calendar dates, and chemical composition for 12 of 14 specimens (Tables 6.5 and 6.6). All the specimens were determined to have been made from obsidian that originated from the Rio Grande Valley as part of the mixed gravels of the Santa Fe group. Implications of these dates are provided within the discussion of absolute and relative dating methods.

Radiocarbon Dating

Five radiocarbon samples collected from fire-cracked rock and burned caliche features were found to contain sufficient wood charcoal

Table 6.5

OBSIDIAN HYDRATION CALENDAR DATES

Specimen Number	Location	Point Type	Temporal Period	Obsidian Date
411	8S 20W IA	Type 10	Late Archaic-Early Formative?	75 BC +/- 93 yrs
132	LA 49382	Type 10	Late Archaic-Early Formative?	464 AD +/- 32 yrs
127	LA 49379	Type 5	Late Archaic-Early Formative?	580 BC +/- 111 yrs
298	LA 49358	Unidentified	Unknown	936 AD +/- 52 yrs
303(6)	LA 49358	Pelona	Middle Archaic	556 AD +/- 86 yrs
283	LA 49357	Pelona	Middle Archaic	634 AD +/- 37 yrs
049	LA 49354	Unidentified	Unknown	1232 BC +/- 37 yrs
050(2)	LA 49354	Small corner-notched	Unknown	73 BC +/- 70 yrs
046	LA 49352	Maljamar	Middle Archaic?	502 BC +/- 115 yrs
366	LA 49328	Reutilized Pelona	Middle Archaic?	936 AD +/- 50 yrs
358	LA 49327	Unidentified	Archaic?	162 BC +/- 72 yrs
005	LA 49317	Chiricahua	Middle Archaic	557 BC +/- 121 yrs

Table 6.6

OBSIDIAN HYDRATION RATES, RIMS, AND SOURCE AFFINITY

Specimen Number	Hydration Rate	Hydration Rim	Na_2O	K_2O	Fe_2O_3T	Source Affinity
0411	6.49 ^{2}/1000 yrs	3.65 +/- 0.08	5.48	4.54	5.40	Rio Grande Gvls #4
0132	6.96 ^{2}/1000 yrs	3.25 +/- 0.03	5.13	4.31	1.06	Rio Grande Gvls #7
0127	3.25 ^{2}/1000 yrs	2.89 +/- 0.06	4.65	4.49	1.13	Rio Grande Gvls #2
0298	14.30 ^{2}/1000 yrs	3.87 +/- 0.09	3.44	5.49	1.27	Rio Grande Gvls #3
0303(6)	6.15 ^{2}/1000 yrs	2.96 +/- 0.09	4.17	4.59	0.64	Rio Grande Gvls #6
0283	7.81 ^{2}/1000 yrs	3.24 +/- 0.04	4.89	4.41	0.73	Rio Grande Gvls #1
0049	3.25 ^{2}/1000 yrs	3.23 +/- 0.06	4.47	4.54	1.00	Rio Grande Gvls #2
0050(2)	7.81 ^{2}/1000 yrs	4.01 +/0 0.07	4.99	4.44	0.87	Rio Grande Gvls #1
0046	3.25 ^{2}/1000 yrs	2.84 +/- 0.07	4.48	4.65	1.08	Rio Grande Gvls #2
0366	14.30 ^{2}/1000 yrs	3.82 +/- 0.09	3.96	5.48	0.97	Rio Grande Gvls #3
0358	3.25 ^{2}/1000 yrs	2.64 +/- 0.04	4.48	4.65	1.08	Rio Grande Gvls #2
0005	3.25 ^{2}/1000 yrs	2.87 +/- 0.07	4.51	4.57	1.04	Rio Grande Gvls #2
0316	-	3.43 +/- 0.08	4.66	4.80	1.03	Unidentified

for analysis. These wood charcoal samples were submitted to Beta Analytic, Incorporated, for dating. The uncorrected radiocarbon age and corrected calendrical date for each sample are presented in Table 6.7. These five dates ranged from the Archaic to the historic period.

Discussion

The radiocarbon and obsidian hydration dates obtained were for the most part within the range of the temporal assignments made on the basis of point typologies and decorated ceramics. Table 6.8 presents a comparison of the results of the relative and absolute dating methods. Unfortunately, the small number of absolute dates makes it extremely difficult to evaluate the relative temporal assignments. Nevertheless, several comparisons can be made.

Obsidian hydration analysis indicates that three projectile points classified as Pelona types may actually date to the formative rather than the middle Archaic. These obsidian dates suggest that the identification of Archaic components solely on the basis of this point type is questionable since this style may also have been in use during ceramic periods. In addition, the obsidian date for one of the two Maljamar-like points recovered provides some support for Smith's (1974) identification of this style with the Archaic. Finally, the small carved-notched point (SN 050[2]) commonly classified as puebloan, obsidian dated unexpectedly to the Archaic.

The above chronological studies provide the basic information necessary to address the nature of prehistoric land use patterns in the Mesilla Bolson from preceramic through ceramic times. Land use patterns within the Mesilla Bolson are summarized and compared with those known for the adjacent Tularosa Basin and Hueco Bolson in Chapter 12.

Table 6.7

RADIOCARBON DATES
(Klein and others 1982)

Specimen Number	Provenience		Dendro Corrected
11238	LA 49325, Feature 1	840 ± 60 B.P.	A.D. 1050-1265
11239	LA 49340, Feature 3	360 ± 50 B.P.	A.D. 1450-1645
11240	LA 49341, Feature 1	960 ± 50 B.P.	A.D. 910-1220
11241	LA 49354, Feature 2	2560 ± 70 B.P.	820-440 B.C.
11242	LA 49372, Feature 1	1320 ± 100 B.P.	A.D. 575-885

Table 6.8

COMPARISON OF RELATIVE AND ABSOLUTE DATING METHODS

LA Number	Radiocarbon Date	Obsidian Hydration Date	Diagnostic Artifacts
49317		557 B.C. ± 121 yrs	Archaic, mixed ceramic
49325	A.D. 1050-1265		Mesilla phase
49327		162 B.C. ± 72 yrs	Mesilla phase
49328		A.D. 936 ± 50 yrs	Archaic, phase unknown
49340	A.D. 1415-1645		Archaic, phase unknown
49341	A.D. 910-1220		El Paso phase
49352		502 B.C. ± 115 yrs	Archaic, mixed ceramic
49354	820-440 B.C.	1232 B.C. ± 125 yrs	Phase unknown
49354		73 B.C. ± 70 yrs	Phase unknown
49357		A.D. 634 ± 37 yrs	Archaic, mixed ceramic
49358		A.D. 936 ± 52 yrs	Archaic, phase unknown
49358		A.D. 556 ± 86 yrs	Archaic, phase unknown
49372	A.D. 575-885		Archaic, phase unknown
49379		580 B.C. ± 111 yrs	Phase unknown
49382		A.D. 464 ± 32 yrs	Archaic, phase unknown

Measuring Assemblage Diversity

As outlined in Chapter 3, a major objective of the Santa Teresa Project was to determine the type and range of activities that were performed at a site. It was argued that the traditionally employed labels, such as habitation or limited-activity site, obscure assemblage variability and do not provide any information on the range of activities that may have occurred. We proposed to more thoroughly assess the range of activities performed at limited activity sites in the Mesilla Bolson by measuring the range of surface artifactual diversity with a diversity index.

The diversity measure selected for use in this study was previously employed by Reid (1982) to provide a procedure to analyze assemblage diversity and interpret settlement variability. A major assumption of this analysis was that ". . . other factors hold constant, the measure of morphological diversity of an assemblage approximates the range of activities performed at a settlement, which, in turn, is a relative measure of length of occupation" (Reid 1982: 196). Reid's analysis found this measure of diversity to be less affected by sample size than other similar indices and an efficient means to reconstruct prehistoric settlement systems.

Table 6.9 lists by material class the artifact categories by material class used in the analysis and outlines the mathematical formula upon which the diversity index is based. The composite diversity score (labeled the J-score by Reid) computed for a settlement is based upon the scores for each artifact category (that is, ceramics, ground stone tools, and chipped stone artifacts) added together and divided by 3 (example, Table 6.10). The J-score for chipped stone tools, although computed, was not figured as part of the composite score because composite tools are included in the chipped stone artifact category. Composite J-scores and J-scores by artifact categories calculated for each site are provided in Table 6.11. More detailed information from which artifact specific J-scores were computed are provided in Tables B.1 through B.68.

Before summarizing the results of the analyses of assemblage variability, it is important to reiterate the fact that most of the sites included in the study possess multiple temporal components. Due to the deflated and mixed nature of the sites, it was not possible to separate assemblages that belonged to different components. Nevertheless, while we cannot control the chronological factor, the results of the analyses have provided us with some interesting intersite varability that would not have been evident had we merely described the resources as limited activity or processing and procurement locales.

The composite diversity indices calculated for the Santa Teresa sites were found to range from 0.0732 to 0.7656 (Table 6.11). The majority (N43) of the scores clustered between 0.2290 and 0.5000. A composite index greater than 0.5800 was computed for nine sites (LA 49327, 49341, 49351, 49356, 49358, 49360, 49364, 49374, and 49386). The broadest range of maintenance, manufacturing, and processing activities can be inferred to have been performed at LA 49436 (Table 6.11 and B.48) as identified by the composite index of 0.7656. LA 49364 covered 15,725 square meters and was occupied from the Archaic through the Mesilla phase. The chipped stone assemblage collected from this site was found to possess all artifact categories with the exception of stage bifaces and end scrapers. The ceramic assemblage was small (N10) and dominated by undecorated jar sherds, although all ceramic categories were present. The abundant number of grinding implements, particularly grinding slabs and pounding implements, suggests a major emphasis on the processing of plant foods.

Figure 6.3 illustrates that a large composite diversity is not necessarily dependent on the size of the assemblage as would be suggested by the index calculated for LA 49364. Several scatters (LA 49337, 49339, and 49357) that possessed large assemblages had composite diversity indices that fell below 0.6000. The range of activities that occurred at these sites is inferred to have been more specialized than those performed at LA 49364. For example, the assemblage collected from LA 49336 encompassed all material classes and covered an area of 13,500 square meters. However, the composite diversity index computed for this assemblage is 0.3937. The ceramic assemblage consists solely of undecorated jar sherds. Grinding implements are few in number, being dominated by artifacts of

Table 6.9

ARTIFACT CATEGORIES EMPLOYED IN ANALYSIS

Ceramics
Decorated bowls
Decorated jars
Undecorated bowls
Undecorated jars

Chipped Stone Tools
Stage biface
End scraper
Side scraper
End-side scraper
Flake scraper
Utilized flake
Other morphofunctional category
Biface form indeterminate
Scraper form indeterminate
Flake with grinding or pecking on dorsal face

Chipped Stone Artifacts
Cores without cortex
Flake Type 1
Flake Type 2
Flake Type 3
Limited-information lithic fragments with cortex
Limited-information lithic fragments without cortex
Limited-attribute flake fragment with cortex
Limited-attribute flake fragment without cortex
Unknown or other flake type
Projectile points
Composite tools

Ground Stone Tools
Manos
Grinding slabs
Basin metate
Trough metate
Pestle
Pounding implements
Axe
Indeterminate ground stone
Ground stone other

DIVERSITY FORMULA

$$J = \frac{H}{H_{max}} \qquad H = \frac{n\log n - {}^{k}fi \log fi}{n}$$

where:

$$H_{max} = \log k$$

1. n = sample size
2. fi = number of observations in category i
3. k = number of categories
4. Any logarithmic base may be used. Base 10 is used in this analysis. A J-score of 1.00 represents maximum possible diversity.

Table 6.10

EXAMPLE, J-SCORES FOR LA 49317

Ceramics J=0.4653	
Decorated bowls	3
Decorated jars	17
Undecorated bowls	0
Undecorated jars	65

Ground Stone Tools J=0.5529	
Manos	0
Grinding slabs	1
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	4
Ground stone other	1

Chipped Stone Tools J=0.1879	
Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	5
Projectile points	1

Chipped Stone Artifacts J=0.3905	
Cores without cortex	1
Flake Type 1	3
Flake Type 2	39
Flake Type 3	3
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	1
Composite tools	0

Composite J-Score
$J=(0.4653 + 0.3905 + 0.5529) \div 3$
$J=1.4087 \div 3$
$J=0.4696$

Table 6.11

COMPOSITES AND J-SCORES BY ARTIFACT CLASSES BY SITE

LA	Sample Size	Ceramics	Ground Stone	Chipped Stone Tools	Chipped Stone Artifacts	Composite
49317	145	.4653	.5529	.1879	.3905	.4696
49318	295	.1104	.4681	.4218	.7639	.4475
49319*	11	.0000	.2277	.0000	.5545	.2607
49320*	6	.0000	.0000	.0000	.4581	.1527
49321	77	.0000	.0000	.5529	.6981	.4170
49322*	62	.0000	.0000	.4732	.5147	.3293
49323	86	.2345	.2559	.2891	.6260	.3721
49324*	5	.0000	.0000	.0000	.0000	.0000
49325	53	.1686	.2576	.0000	.6989	.3750
49326	58	.0000	.6931	.0000	.6351	.4427
49327	129	.2750	.7561	.6463	.7906	.6072
49328*	57	.0000	.3914	.5781	.6495	.3469
49329	57	.2524	.2897	.0000	.4424	.3282
49330	71	.1290	.4265	.4582	.7930	.4495
49331	39	.0000	.2723	.0000	.4484	.2402
49332	39	.1176	.4325	.0000	.6231	.3911
49333*	11	.2197	.0000	.0000	.0000	.0732
49334	19	.0000	.2897	.0000	.7179	.3359
49335	20	.8387	.2897	.0000	.0000	.3761
49336	201	.0000	.4173	.8122	.7637	.3937
49337*	37	.0000	.6309	.2654	.7289	.4533
49338*	46	.0000	.1787	.5059	.7643	.4715
49339	289	.2698	.6804	.8279	.7706	.5736
49340	82	.0000	.6534	.5556	.7382	.4639
49341	325	.6584	.7087	.2891	.5059	.6243
49342	250	.6545	.3018	.4582	.6927	.5496
49343	99	.2069	.4087	.5916	.8522	.4893
49344	152	.6085	.3763	.2574	.7298	.5715
49345	85	.0000	.4823	.0000	.7166	.3996
49346	195	.2787	.5942	.4336	.6737	.5155
49347	122	.3361	.4783	.5326	.8524	.5556
49348	139	.0000	.6449	.6351	.7687	.4712
49349*	85	.0000	.7039	.2891	.6653	.4564
49350	90	.2687	.5966	.0000	.6320	.4991
49351	98	.5000	.6420	.5174	.7402	.6274
49352	118	.4015	.5406	.5795	.6964	.5462
49353	303	.6029	.3637	.2764	.5480	.5049
49354	144	.0000	.2827	.0000	.6156	.2994
49355	654	.0000	.7853	.6908	.7084	.4979
49356	188	.6781	.4317	.5939	.7767	.6288
49357	356	.4492	.5390	.7931	.7682	.5855

Table 6.11, continued

COMPOSITES AND J-SCORES BY ARTIFACT CLASSES BY SITE

LA	Sample Size	Ceramics	Ground Stone	Chipped Stone Tools	Chipped Stone Artifacts	Composite
49358	432	.0000	.5229	.5939	.7655	.4295
49359	137	.4149	.2548	.4582	.7582	.4774
49360	113	.5236	.6309	.0000	.6564	.6036
49361	114	.0000	.4682	.3986	.6027	.3569
49362	74	.1432	.3908	.4582	.6777	.4039
49363	25	.0000	.6214	.4582	.5545	.3919
49364	473	.7855	.7056	.8083	.8057	.7656
49365	43	.0000	.7098	.0000	.6590	.4563
49366	77	.0000	.5325	.2654	.7837	.4387
49367	28	.0000	.2559	.3010	.6351	.2970
49368	137	.1651	.3348	.0000	.7149	.4049
49369*	112	.0000	.4575	.0000	.6820	.3798
49370*	67	.0000	.2908	.0000	.6822	.3243
49371*	16	.0000	.6186	.0000	.2654	.2946
49372	283	.0348	.4008	.6645	.7749	.4035
49374	65	.1686	.5956	.0000	.5979	.4540
49376	103	.0000	.2917	.4513	.5982	.2966
49377*	110	.0000	.4840	.6603	.8320	.4389
49378*	37	.0000	.2764	.0000	.5659	.2808
49379	140	.0000	.5892	.6351	.7176	.4356
49380*	21	.0000	.1234	.2891	.5509	.2248
49381	208	.2197	.6493	.9024	.7110	.5267
49382	113	.3919	.3749	.7072	.6378	.4682
49383*	93	.0000	.4469	.4336	.7020	.3830
49384	141	.0000	.4921	.5781	.7179	.4033
49385	144	.1507	.2632	.4541	.7286	.3808
49386	130	.4591	.5252	.5556	.7785	.5876

* 5 or less ceramics

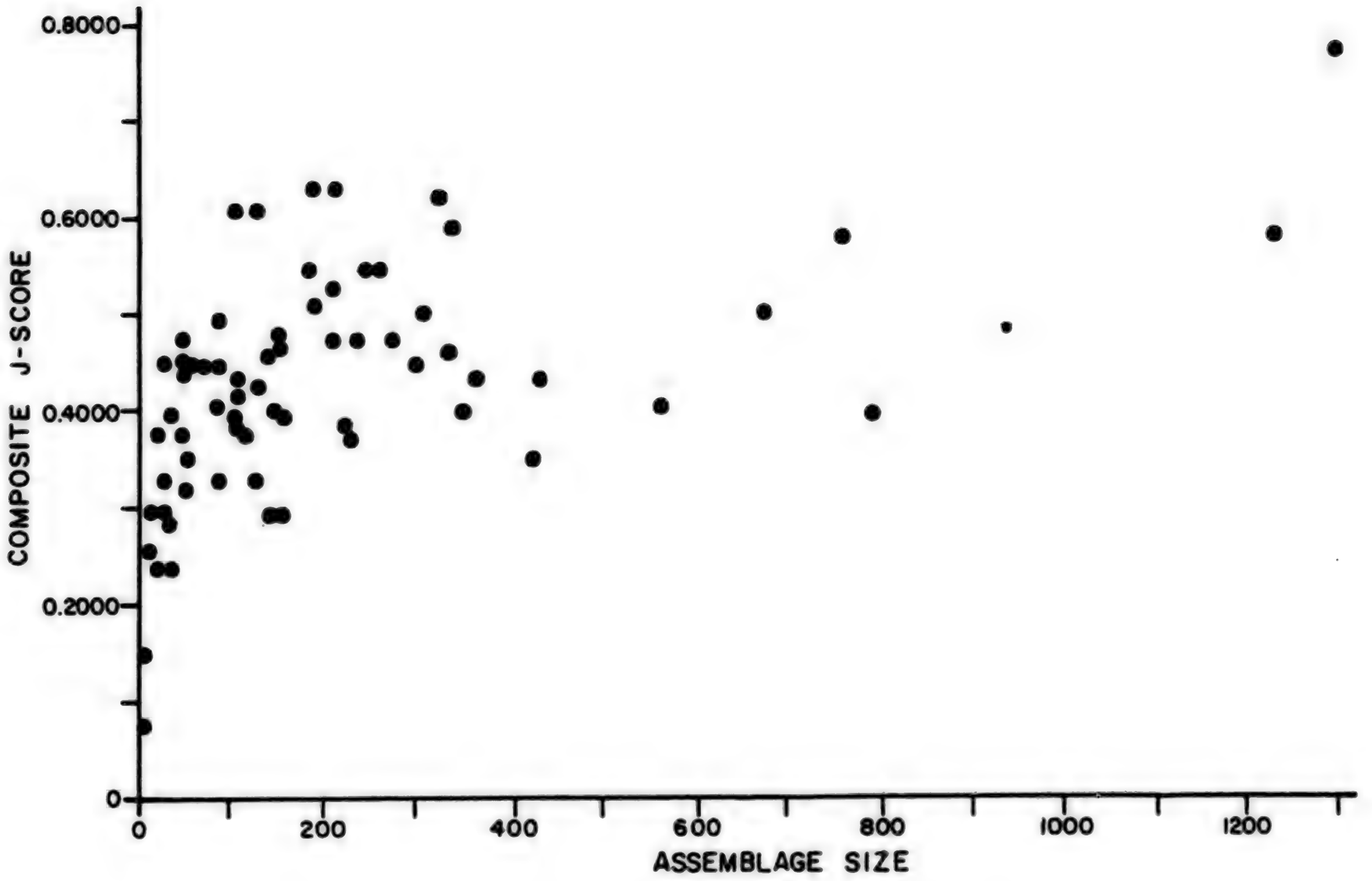

Figure 6.3. Composite J-score by assemblage size.

indeterminate function. The chipped stone assemblage is dominated by reduction debitage rather than formal tools, although tools of every type, with the exception of projectile points, have at least one occurrence. The absence of projectile points does not necessarily imply that hunting related activites were not performed at LA 49336.

In addition, three sites (LA 49327, 49356, and 49360) that had composite diversity indices that exceeded 0.6000 were significantly smaller than LA 49364, 49337, 49339, and 49357 in terms of aerial coverage and assemblage size (Tables 6.1, 6.11, B.11, B.40, and B.44). The composite diversity indices computed for these sites ranged from 0.6036 to 0.06288. In general, a similar range of activities were performed at these sites when compared to each other. The ceramic assemblages collected from each of the sites was dominated by undecorated jar sherds. Most categories of ground stone implements were present with indeterminate ground stone artifacts being the most prevalent. Procurement and processing activities dependent upon specialized chipped stone tools were clearly less often performed at LA 49360 than the other two settlements.

Comparisons of J-scores calculated for each artifact category by site (that is ceramics, ground stone, and chipped stone) have provided some interesting intersite and intrasite variability that was obscured in composite indices. Ceramic assemblages are generally very specialized because they are most often dominated by undecorated jar sherds (examples, LA 49318, 49330, 49331, and 49362). Ninety percent of the sites had J-scores that ranged from 0.0000 to 0.5999, while the remainder did not exceed 0.8387 (Table 6.11). Not unexpectedly, most sites that possessed late Mesilla and El Paso phase components had large J-scores indicating a broad range of activities were performed that involved the use of ceramic containers (examples LA 49335, 49341, 49342, 49344, 49353, and 49356). The assemblage recovered from LA 49335, for example, was composed of one decorated bowl sherd, seven decorated jar sherds, two undecorated bowl sherds, and six undecorated jar sherds.

Ground stone tools were present on all sites, with the exception of LA 49333. The J-scores calculated for this artifact class suggest that a similar and fairly broad range of plant processing activities occurred at many of the sites. Assemblages are dominated by fragmented indeterminate ground stone and ground stone other categories. Sixteen sites, however, had J-scores that ranged from 0.6186 to 0.7853 based on ground stone assemblages that consisted of 4 to 331 artifacts. LA 49327, 49349, and 49355 are examples of sites that possessed the full range of grinding implements (Tables B.11, B.33, and B.39). As illustrated in Figure 6.4, small J-scores are usually the result of assemblage size rather than indicative of more specialized activities.

Seventy-three percent of the sites had J-scores for the chipped stone artifact category that exceeded 0.6000 (Fig. 6.5). In general, a wide range of procurement and processing activities are presumed to have occurred at these sites. The most diverse chipped stone artifact assemblages were recovered from LA 49343, 49347, 49364, and 49377 (Tables B.27, B.31, B.48, and B.59). These assemblages generally contain more items that are the result of tool manufacture rather than

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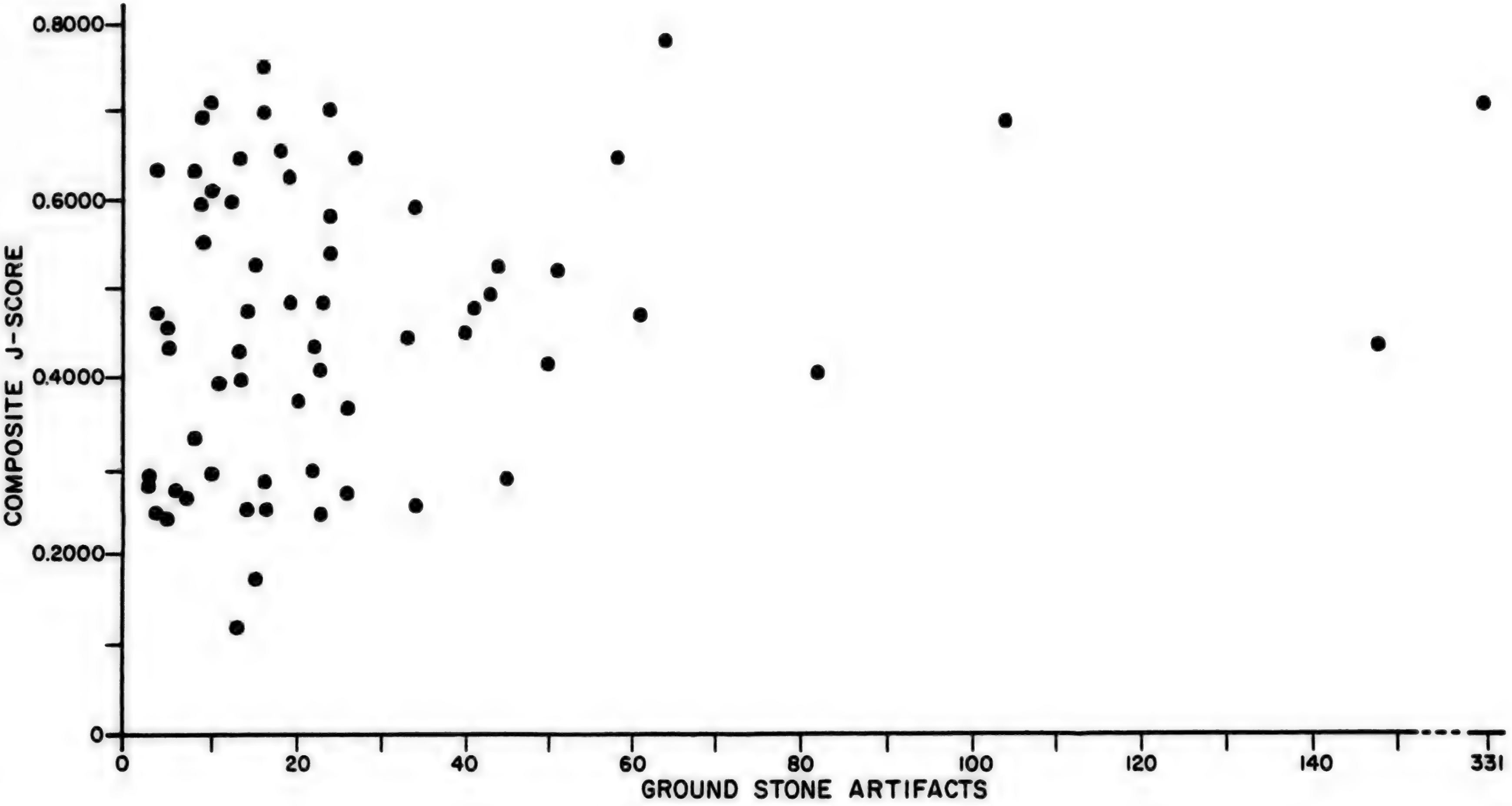

Figure 6.4. Ground stone artifacts plotted by composite J-score.

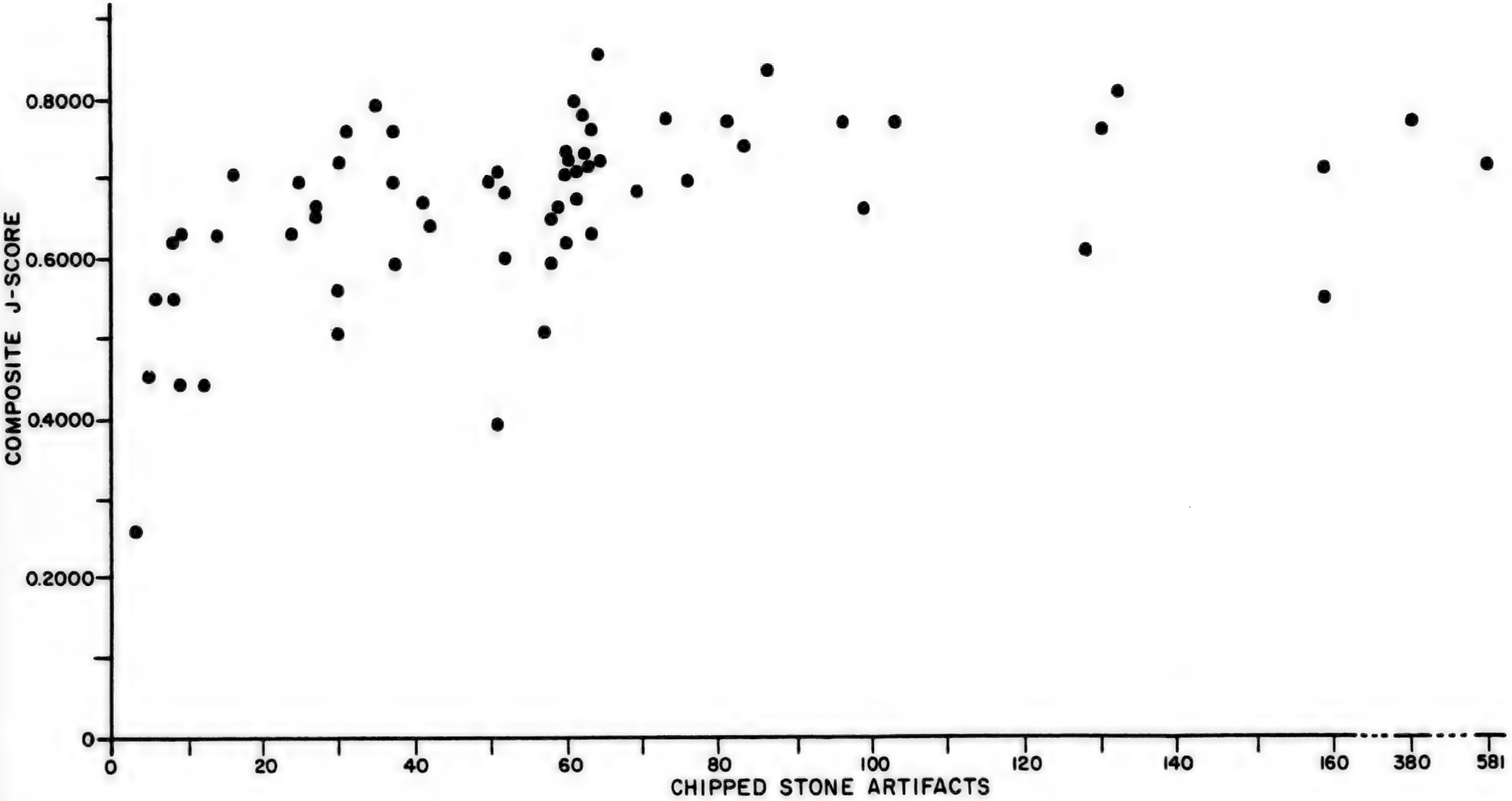

Figure 6.5. Chipped stone artifacts plotted by composite J-score.

tool use (example, LA 49364, Table B.40). In numerous instances, the analysis of chipped stone artifacts resulted in a J-score that exceeded 0.6000, although relatively few tools were present within the assemblage. Consequently, J-scores were also calculated for the chipped stone tool assemblage by site (Table 6.11). This analysis was necessary to better assess chipped stone artifact variability. Clearly, this analysis has indicated that some of the sites possessed more specialized chipped stone assemblages as reflected by the relatively small number of tools present (examples LA 49323, 49325, 49332, 49334, 49337, 49344, 49345, 49360, 49365, and 49368).

In general, the use of the diversity index has provided more information on assemblage variability than would have been available through the use of traditional labels. To some extent, it has been possible to assess the range and type of activities that were performed at the Santa Teresa sites. A more specialized range of activities were performed at some of the limited activity sites as indicated by the composite diversity indices. Problems with the Santa Teresa data, particularly with regard to small sample sizes and lack of chronological control, limits the extent to which the composite diversity indices can be confidently used. For example, no attempt was made to functionally categorize the resources (that is, hunting camps, plant processing, and so forth) and reconstruct the subsistence-settlement system because of due to the weakness of the data. The results of the analyses suggest, however, that the use of a measure of assemblage artifact diversity can provide a better understanding of variability than traditional measures.

Chapter 7

RESULTS OF ANALYSIS: LITHICS

Patricia A. Hicks

Description of Raw Material and Lithic Implements in the Santa Teresa Collection

Artifacts fashioned from stone frequently represent the majority of the artifact materials recovered from prehistoric contexts and these artifacts have the potential for revealing considerable information concerning the behaviors of the prehistoric peoples who fashioned them. In the analysis reported here, recording was focused on the kind of implement represented by the artifact and the material from which it was manufactured. These data can be used for a variety of purposes, some of which include studies of preferences of raw materials used in the production of specific artifact classes; elucidation of changes in the frequencies of specific artifact classes and material types through time, which may aid in the dating of sites with unknown temporal affiliations; the drawing of inferences concerning the kinds of activities that took place on a site or in a region; and recognition of the presence of artifacts of different stylistic traditions or nonlocal raw materials, which can be used to determine whether trade or other forms of contact existed between the area under study and adjacent or far distant regions.

The recording form employed in this analysis was constructed to aid the encoding of information for computer data entry (Fig. 7.1). A primary implement class was assigned to each artifact. Flake tools and some composite core tools (for example, choppers) were recorded using both the primary implement code as well as a secondary morphofunctional code. Each primary implement class and morphofunctional class was defined in a "Dictionary" in an effort to maintain consistency between analysts. Each artifact was assigned to a material type. Accurate identification of the material type was facilitated by use of a binocular microscope with variable optical settings of 10 to 45X.

Additional information was collected on each artifact. This information includes the presence or absence of retouch on the item and whether or not this retouch is unifacial, bifacial, or utilization related; the presence or absence of indication of heat treatment on the artifact; and the condition of the piece (for example, whole, partial, fragmentary, broken but able to be reconstructed, heat altered, or altered by the analyst by scratching or breakage to facilitate removal of carbonates or material identification). These classes of data have not yet been subjected to data reduction and analysis. Such analyses when undertaken can be expected to yield additional insights into the behavior of the inhabitants of the project area.

Figure 7.1. EL PASO PRELIMINARY SORT RECORDING FORM

100 m unit # / Site # / Locus / IM # / IA' # / Exact Prov. / Field No.

Analyst

Date

Field # Eq.

Imp Cat / Tech Atts / Cond Sts / Mat Type / M-F Cat / # Items

During the course of the Santa Teresa survey, a total of 14,958 stone artifacts were collected as isolated artifacts or as a part of isolated manifestations or site assemblages. Of this total 9639 artifacts, or 64.4 percent of the total, were subjected to analysis.

The large number of artifacts collected and the limited time and personnel available for analysis necessitated a sampling procedure that would produce a maximum of information from the collections. To this end, all isolated artifacts were analyzed as were all artifacts from isolated manifestations. Sites containing large numbers of artifacts were sampled according to the following procedure. Each site collection was carefully examined for ground stone implements, cores and composite tools, pounding implements (for example, hammerstones and pecking stones), projectile points and other bifaces, scrapers and other formal flake tools, and utilized flakes. All of these tools were set aside and later subjected to analysis. The artifacts remaining after this initial sort consisted of the debitage collected from the site. The items in this artifact class were randomly laid out on a table whose surface consisted of a grid with each square numbered individually in a consecutive fashion. If the total amount of debitage exceeded 50 pieces a random sampling procedure was then instituted. This procedure was simplified as much as possible and was carried out in the following manner. One analyst was asked to select a number between one and the number representing the debitage total. This number served as the beginning point for selection of the sample. A second analyst was then asked to select a number between one and the number that represented the total amount of debitage divided by 50. This dividend was then used as the sampling interval. Using this interval a statistically valid sample of 50 debitage artifacts was then selected for analysis.

Report Organization

As a part of the raw material studies, two attempts were made to apply the Lithic Diversity Index developed by Carmichael (1982a) to the Santa Teresa assemblages. The results of two trials will be presented and the use of this index evaluated. Next, the various implement classes present in the collections will be described. In this section the results of several studies seeking temporally sensitive patterning in the utilization of specific classes of artifacts will be addressed. In the concluding section on implement classes, projectile points recovered during the Santa Teresa survey will be individually described and an assessment of potential temporal affiliation will be provided for those artifacts not assigned to an existing type.

Lithic Raw Materials at Santa Teresa

The raw materials used in the manufacture of stone tools were a major resource for most prehistoric cultures, and archaeologists have long been interested in the source location for the materials in their assemblages (for example, Holmes 1890, 1891; Morris 1939; Bryan 1939;

Bryan and Butler 1940). There are several reasons for this interest in resource location and the increase in lithic resource related studies in recent years (for example, Warren 1967, 1977, 1982, 1984; Shelley 1980; Gossett 1982; Moore 1983; Hicks 1985). Archaeological studies of stone tools are becoming more technologically oriented, and to better understand the technologies employed by prehistoric groups, it is first necessary to develop knowledge of the lithic resource base. Such knowledge involves but is not limited to understanding what kinds of materials are available in what proportions in the local environment, what forms these raw materials take, what is the quality of these materials, and where are these materials located with respect to the site or sites under study. These questions are of great importance to a technological study because different kinds of raw materials necessitate varying reductive strategies (Crabtree 1967), as do raw materials of different shapes. Also, by gaining an understanding of the kinds of materials that are available within a specific region, materials of nonlocal origin can be identified in an assemblage. The presence of nonlocal materials in an assemblage has implications for the study of trade networks, population movement, or other forms of contact. Their presence may also be significant in the study of semi- or nonsedentary versus sedentary subsistence strategies (O´Laughlin 1980; Carmichael 1982a).

An in-depth technologically oriented attribute study of cores and debitage from the Santa Teresa survey is beyond the scope of the present study. Some technological information as derived from observations made during the lithic analysis is included in the section of this report describing the implement types recovered. The best current information on reduction strategies in the El Paso area is provided in an excellent summary by O´Laughlin (1980). Many of the observations made for the Santa Teresa assemblages confirm the data contained in his summary.

Geologic Origins of Lithic Materials in the El Paso Area

The geologic history of the El Paso area is quite complex and has been summarized by Lovejoy (1980). Faulting, folding and uplifting of various mountain ranges such as the Franklins have exposed various deposits ranging from Precambrian to Cretaceous in age (Harbour 1972). A number of the strata in the Franklin Mountains are known to contain chert lenses or clasts, and other stone materials of importance to the prehistoric inhabitants of the region. The information summarized here has been derived from Harbour (1972). The Precambrian Castner Limestone contains lenses of a light gray chert as well as metamorphic minerals such as serpentine, dark brown garnet, and layers of a metamorphosed laminated siltstone. The Mundy Breccia that uncomformably overlies the Castner Limestone contains altered boulders of basalt, which are fine grained and, therefore, may be suitable for use in stone tool production. The Lanoria Quartzite is composed of 2600 feet of metamorphosed sandstone, siltstone and shale, all of which are fine in texture. The colors of these materials range from black and light gray to brown, to green with red mottling, to white. The uppermost

Precambrian unit is composed of an unnamed rhyolite that is colored red to black and of varying composition. All of its varieties are porphyritic and contain feldspar phenocrysts in a fine grained matrix. This is the only rhyolitic stratum noted by Harbour (1972). However, Bradley (1983) notes that in the western part of the south Franklin Mountains the Thunderbird Rhyolite is exposed. This material differs from the unnamed rhyolite in that it is very coarse grained, porphyritic, with numerous angular rose colored phenocrysts, and does not have conchoidal fracture. The El Paso Limestone of Ordovician age contains chert in the form of compact gray nodules and lenses, as well as replacement of various fossil forms. It also occurs as an internal network of dolomitic chert that weathers as raised tan mottles. The Aleman Member of the Montoya Dolomite is described as containing numerous layers, lenses, and nodules of a dark gray chert. The Silurian Fusselman Dolomite contains veinlike networks of chert which in places are concentrated into clear crystalline quartz nodules grading outward into the dolomite. In the lower part of the Middle Devonian strata exposed in the area there are lenses of dark gray chert which occurs in lenses that make up roughly 50 percent of the matrix. The Las Cruces Limestone uncomformably overlies the Devonian strata in the Franklin Mountains. This limestone is very fine grained, black weathering to white, dense and brittle, and shatters like glass when broken. This limestone is said to be chert-free in most localities except at Anthony's Nose where layers of a black chert a few inches thick are found in the basal 20 feet. The Rancheria Formation overlies the Las Cruces Limestone. Outcrops in the northern Franklin Mountains are said to be characterized by thin beds of laminated, nearly black cherty limestone. Bedding lamination is commonly preserved in the chert, which is secondary in origin. The chert in this formation sometimes occurs in nodules as well as lenses, with colors that vary from dark gray to black. The Pennsylvanian Magdalena Formation contains some chert in all of its members. The chert from this formation is generally black in color and occurs in lenses as well as nodules. The Permian Hueco Limestone consists of massive beds of cherty, fossiliferous limestone. Although chert occurs in all members, the Middle Unit apparently contains the largest amount with abundant chert in gray nodules and as fossil replacement. Harbour (1972) notes that Cretaceous rocks in the El Paso area are generally limited to small outliers detached from the main mountain masses by faults and separated from each other by a cover of Cenozoic basin deposits. He does not describe these strata in his report. The outcrop of Cretaceous rocks closest to the Santa Teresa study area is located in the Cerro de Cristo Rey to the southeast.

As reviewed above, it is clear that cherts having a variety of colors and a variety of origins are present in the Franklin Mountains east of the Santa Teresa project area. O'Laughlin (1980) noted that little of this material is of suitable quality for use in the manufacture of stone tools. However, because O'Laughlin and other researchers have not yet published in-depth studies of these resources, it is considered here that the Franklin Mountains may be one of the primary sources of local cherts.

Other, more distant sources of cherts occur in the El Paso area. These locations are mentioned here because they may possibly have been exploited as resources at some time in the past. Carmichael (1982a) discusses a "Lake Valley Chert" that occurs in the Lake Valley Formation, which outcrops in the San Andres and Caballo Mountains northeast of the Santa Teresa study area. This chert is characterized by bands of light gray and cream. Cherts can also be found in the vicinity of the East and West Potrillos Mountains west of the study area and in the Sierra de las Uvas to the northwest (P. Shelley, personal communication). These cherts are generally red and white or orangish-yellow. There is one distinctive variety locally known as Laguna Agate that is characterized by swirls of orange, orangish-yellow and red with white chalcedonic and quartz inclusions.

Other materials of importance to the prehistoric inhabitants of the El Paso area were rhyolite, fine-grained basalt, fine-grained quartzite, obsidian, and sandstone. The presence of two kinds of rhyolite in the Franklin Mountains has already been noted. Foster, Bradley, and Foix (1982) discuss a variety of rhyolite, light gray to rose-purple in color with phenocrysts of biotite that they procured from an unnamed locality in western Zacatecas, Mexico. Fine grained basalt occurs as large boulders in the Mundy Breccia in the Franklin Mountains. Olivine basalt of varying textures is also available in the vicinity of the Afton Craters to the west of the study area. Quartzite with a fine grained texture is characteristic of the Lanoria Quartzite in the Franklin Mountains and may be present as lenses in other formations in the same area, as well as in some Cretaceous strata. The source for obsidian most commonly cited in the El Paso area is the axial gravels of the Rio Grande, where it occurs as small nodules with a heavily weathered cortex (O'Laughlin 1980; Carmichael 1982a; Bradley 1983). Small Apache Tears of obsidian have also been noted in the vicinity of Kilbourne Hole northwest of the Santa Teresa project area (M. Proper, personal communication). Sandstone lenses are found interbedded with other materials in various of the strata exposed in the Franklin Mountains and probably occur as a major constituent in Cretaceous strata near the study area.

Regional Lithic Sources

In spite of the widespread distribution of these geologic sources, it was probably possible for the occupants of the Santa Teresa Study area to obtain suitable lithic materials in the immediate region. The study area is located on the La Mesa surface, which is underlain by the Camp Rice Formation. This formation is considered by Hawley and others (1969) to represent the upper limit of the Pleistocene Santa Fe Group in the El Paso area. This stratigraphic unit was deposited by the ancestral Rio Grande and is coarse in texture owing to the presence of numerous gravels, some of which have been derived from sources some distance upstream (Hawley and others 1969). This gravel deposit has been exposed 2 to 3 miles to the east of the study area by down cutting of the Rio Grande and was probably the most significant source locality for raw material procurement by the prehistoric inhabitants of the region. Bradley (1983) notes that the cherts present in these gravels are of both local and nonlocal origin and represent a wide range of variability in both color and flaking quality. Fine- to coarse-grained quartzites are common in the gravels on the west side of the river, but are somewhat larger on the bajada slopes to the east. Limestone is the most common material in the gravels, followed by various kinds of rhyolite and quartzites (Bradley 1983). Sandstone, basalt, and obsidian are also present in small quantities. Although not discussed by either O'Laughlin (1980) or Bradley (1983) other rock types are probably present in these gravels. Materials present in the Santa Teresa assemblages that exhibit an alluvial cobble cortex which may have been collected from these gravel exposures include andesite, granite, diorite, granodiorite, felsite, silicified wood, and chalcedony.

Lithic Raw Materials at Santa Teresa

Figure 7.2 illustrates the codes used to record the material types of the implements in the Santa Teresa assemblages. The categories employed here follow standard geologic usage. Members of the field laboratory subdivided some categories of material by color and inclusion type, and this recording system has been maintained throughout the analysis for consistency. However, it should be recognized that the use of color is not a reliable basis for identifying source localities of different materials (Thompson 1979). Rock color is produced by the presence of various chromophores, which may occur in as little as one or two parts per million. The interaction of these chromophores imparts color to the stone, and with even the slightest change in their makeup, a different color can be evident (P. Shelley, personal communication). A good example of this can be found in the materials from the well known quarry at Alibates, Texas. Archaeologists working on the Plains and in parts of eastern New Mexico readily recognize a good quality chert with a mottled blue, purple and white color scheme as coming from this source. However, also present at this quarry are cherts (actually silicified dolomites) that have a bluish-gray color, which are most frequently called "Edwards Plateau chert" and are commonly associated with strata in west-central Texas, and another chert variety which possesses a distinctive red and yellow mottling, that resembles the materials from the Quitaque quarries. If all of these materials were found in the same archaeological assemblage and assigned to a source simply on the basis of color, three source localities might be inferred when in fact all three varieties of chert came from the same source. In brief, color may suggest a source location, but until the material is analyzed petrographically and geochemically, source assignment on the basis of color alone must be viewed as simply a "best guess."

The large number of material categories originally recognized in the field posed some problems in data presentation. To overcome these, a number of categories were grouped together. Figure 7.3 gives the codes for these groups. In general, where a material was originally broken down by color or types of inclusions, these materials were grouped together under the "undifferentiated" code. Major textural categories such as fine- versus coarse-grained rhyolite, fine- or coarse-grained quartzite, and so forth, have been maintained as these frequently affect the manner in which these materials fracture. Unlike

IGNEOUS TYPES

001.	Tuff
002.	Welded tuff
003.	Pumice
004-00.	Obsidian undifferentiated
004-01.	Obsidian, opaque, occurring in small pebbles
004-02.	Obsidian, translucent w/dark flow lines
004-03.	Obsidian, opaque w/black and gray banding
004-04.	Obsidian, dense black w/small white inclusions (tachylyte)
005.	Polvadera obsidian
006.	Jemez obsidian
007.	Vitrophyre
008.	Grants obsidian
009-00.	Basalt, fine grained, undifferentiated
009-01.	Basalt, fine grained, grey
009-02.	Basalt, fine grained, black
010.	Basalt, coarse grained, undifferentiated
011.	Vesicular basalt
012.	Gabbro
013-00.	Andesite, fine grained, undifferentiated
013-01.	Andesite, fine grained, grey ground mass
014.	Andesite, coarse grained, undifferentiated
015.	Granodiorite, fine fabric
016.	Granodiorite, coarse fabric
017-00.	Rhyolite, fine grained, undifferentiated
017-01.	Rhyolite, fine grained, purple w/small white inclusions
017-02.	Rhyolite, fine grained, brown w/large white inclusions
017-03.	Rhyolite, fine grained, black w/small white inclusions
017-04.	Rhyolite, very fine grained, light brown/light purple
017-05.	Rhyolite, fine grained, orange/red w/pink and smokey gray inclusions
017-06.	Rhyolite, fine grained, dark gray, may have large pink inclusions
017-07.	Rhyolite, fine grained, light gray
017-08.	Rhyolite, fine grained, dark brown w/small white inclusions
017-09.	Rhyolite, fine grained, white/cream - black
017-10.	Rhyolite, banded
018-00.	Rhyolite, coarse grained, undifferentiated
018-01.	Rhyolite, coarse grained, purple w/small white inclusions
018-02.	Rhyolite, coarse grained, purple w/large white inclusions
018-03.	Rhyolite, coarse grained, black w/small white inclusions
018-04.	Rhyolite, coarse grained, brown w/large white inclusions
018-05.	Rhyolite, coarse grained, orange/red w/pink and smokey gray inclusions
018-06.	Rhyolite, coarse grained, dark gray, may have large pink inclusions
018-07.	Rhyolite, coarse grained, light gray
018-08.	Rhyolite, coarse grained, dark brown w/small white inclusions
018-09.	Rhyolite, coarse grained, white/cream - black
019.	Granite
020.	Felsite, fine fabric
021.	Igneous other, fine fabric
022.	Igneous other, coarse fabric
023.	Scoria
024.	Diorite

Figure 7.2. Santa Teresa Project: Material Type Codes

SEDIMENTARY TYPES

027. Jet
028. Fossiliferous limestone
029-00. Limestone, undifferentiated
029-01. Limestone, gray
029-02. Limestone, light brown
030. Fossiliferous shale
031. Baked shale
032. Shale, undifferentiated
033. Mudstone/siltstone
034. Brushy Basin silicified siltstone
035. Sandstone, fine grained
036. Sandstone, medium grained
037. Sandstone, coarse grained
038. Greywacke, fine grained
039. Greywacke, medium grained
040. Greywacke, coarse grained
041-00. Orthoquartzite, undifferentiated
041-04. Orthoquartzite, gray with no inclusions
041-05. Orthoquartzite, white with gray banding
041-06. Orthoquartzite, mottled light purple
041-07. Orthoquartzite, black
042. Arkose
043. Conglomerate
044. Breccia
045. Sedimentary other, fine grained
046. Sedimentary other, medium grained
047. Sedimentary other, coarse grained

METAMORPHIC TYPES

050. Slate
051. Phyllite
052. Schist
053. Gneiss
054. Greenstone
055-00. Fine grained quartzite (0-1/2 mm), undifferentiated
055-01. Fine grained quartzite, dark gray grading to brown
055-02. Fine grained quartzite, light brown/buff
055-03. Fine grained quartzite, light gray
055-04. Fine grained quartzite, yellowish brown
055-05. Fine grained quartzite, dark red/brown
055-06. Fine grained quartzite, white
055-07. Fine grained quartzite, purple
055-08. Fine grained quartzite, black
055-09. Fine grained quartzite, orange
056-00. Coarse grained quartzite (1/2+ mm), undifferentiated
056-01. Coarse grained quartzite, dark gray grading to brown
056-02. Coarse grained quartzite, light brown/buff
056-03. Coarse grained quartzite, light gray
056-04. Coarse grained quartzite, yellowish brown

Figure 7.2. Continued

METAMORPHIC TYPES (cont'd)

056-05.	Coarse grained quartzite, dark red/brown
056-06.	Coarse grained quartzite, white
056-07	Coarse grained quartzite, purple
056-08.	Coarse grained quartzite, black
056-09.	Coarse grained quartzite, orange
057.	Nacemiento quartzite
058.	Vallecitos conglomerate
059.	Marble
060.	Metamorphic other, fine grained
061.	Metamorphic other, coarse grained
062.	Schisty quartzite
063.	Meta-igneous fine fabric
064.	Meta-igneous coarse fabric

MINERALS

SiO_2 Varieties

065-00.	Quartz crystal, undifferentiated
065-01.	Quartz crystal, white
066.	Massive quartz
070-00.	Silicified wood, chalcedonic, undifferentiated
070-01.	Silicified wood, chalcedonic, dark brown
070-03.	Silicified wood, chalcedonic, light brown
070-03.	Chalcedonic wood, white translucent w/brown striations
071-00.	Poorly silicified wood, undifferentiated
071-01.	Poorly silicified wood, dark brown
071-02.	Poorly silicified wood, light brown
071-03.	Poorly silicified wood, white translucent w/brown striations
072-00.	Well silicified wood, undifferentiated
072-01.	Well silicified wood, dark brown
072-02.	Well silicified wood, light brown
072-03.	Well silicified wood, white translucent w/brown striations
073.	Silicified palm
074.	Opal
075-00.	Chalcedony, undifferentiated
075-01.	Chalcedony, light brown, nearly opaque, translucent edges, glossy
075-02.	Chalcedony, translucent w/numerous red and yellow inclusions
075-03.	Chalcedony, translucent w/white inclusions predominately w/occasional orange or black inclusions
075-04.	Chalcedony, translucent w/black inclsuions predominately and occasionally white inclusions
076.	Washington Pass chert (chalcedony)
077.	Brushy Basin chert
078.	Fossiliferous chert
079-00.	Chert, undifferentiated
079-01.	Chert, dark gray w/brown inclusions - may grade to a dark/light banded gray
079-03.	Chert, gray
079-04.	Chert, tan/gray. Wide banding or mottled

Figure 7.2. Continued

MINERALS

SiO_2 Varieties (cont'd)

079-05.	Chert, orange/red, glossy luster
079-06.	Chert, black
079-07.	Chert, brown w/white quartz inclusions
079-08.	Chert, black w/narrow orange banding
079-09.	Chert, purple, may grade into brown
079-10.	Chert, light brown
079-11.	Chert, dark brown
079-12.	Chert, red to reddish brown
080.	Jasper
081.	SiO_2 other
082.	Fossil bone

Other Mineral Varieties

085.	Magnetite
086.	Specular hematite
087.	Hematite earthy
088.	Hematite other
089.	Limonite earthy
090.	Limonite other
091.	Galena
092.	Turquoise
093.	Malachite
094.	Azurite
095.	Aragonite/calcite
096.	Calcite spar
097.	Caliche
098.	Kaolin
099.	Talc
100.	Muscovite
101.	Biotite
102.	Lepidolite
103.	Chyrscolla
104.	Serpentine
105.	Flourite
106.	Garnet
107.	Gypsum
108.	Mineral other
109.	Mineral indeterminate
110.	Lithic indeterminate
115.	Bone
116.	Shell
117.	Wood
118.	Glass
119.	Metal

Figure 7.2. Continued

IGNEOUS

001.	Tuff	Tuffs, code 001
002.	Welded tuff	
003.	Pumice	
004-00.	Obsidian undifferentiated	Obsidian, undifferentiated, code 004
004-01.	Obsidian, opaque, occurring in small pebbles	
004-02.	Obsidian, translucent w/dark flow lines	
004-03.	Obsidian, opaque w/black and gray banding	
004-04.	Obsidian, dense black w/small white inclusions (tachylyte)	
006.	Jemez obsidian	
007.	Vitrophyre	Basalts, undifferentiated, code 009
009-00.	Basalt, FG, undifferentiated	
009-01.	Basalt, FG, grey	
009-02.	Basalt, FG, black	
010.	Basalt, CG, undifferentiated	
012.	Gabbro	
013-00.	Andesite, FG, undifferentiated	Andesites, undifferentiated, code 014
013-01.	Andesite, FG, grey	
014.	Andesite, CG, undifferentiated	
017-00.	Rhyolite, FG, undifferentiated	Fine fabric rhyolites, undifferentiated, code 017
017-01.	Rhyolite, FG, purple w/white inclusions	
017-02.	Rhyolite, FG, brown w/irregular white inclusions	
017-03.	Rhyolite, FG, black w/small white inclusions	
017-04.	Rhyolite, VFG, light brown/light purple	
017-05.	Rhyolite, FG, orange/red w/pink and gray inclusions	
017-06.	Rhyolite, FG, dark gray, may have irregular pink inclusions	
017-07.	Rhyolite, FG, light gray	
017-08.	Rhyolite, FG, dark brown w/small white inclusions	
017-09.	Rhyolite, FG, white/cream - black	
017-10.	Rhyolite, banded	
018-00.	Rhyolite, CG, undifferentiated	Rhyolites, coarse grained, undifferentiated, code 018
018-01.	Rhyolite, CG, purple w/small white inclusions	
018-02.	Rhyolite, CG, purple w/irregular white inclusions	
018-03.	Rhyolite, CG, black w/small white inclusions	
018-04.	Rhyolite, CG, brown w/irregular white inclusions	
018-05.	Rhyolite, CG, orange/red w/pink and gray inclusions	
018-06.	Rhyolite, CG, dark gray, may have ittegular pink inclusions	
018-07.	Rhyolite, CG, light gray	
018-08.	Rhyolite, CG, dark brown w/small white inclusions	
018-09.	Rhyolite, CG, white/cream - black	
016.	Granodiorite, coarse	Igneous other, coarse, code 022
019.	Granite	
022.	Igneous other, coarse	
023.	Scoria	
024.	Diorite	
020.	Felsite, fine fabric	Igneous other, fine, code 021
021.	Igneous other, fine fabric	

Figure 7.3. Material Type Groupings for Santa Teresa Data Presentation

SEDIMENTARY

029-00.	Limestone, undifferentiated	Limestone, undifferentiated, code 029
029-01.	Limestone, gray	
029-02.	Limestone, light brown	
033.	Mudstone/siltstone	Sedimentary other, code 045
034.	Brushy Basin silicified siltstone	
041-00.	Orthoquartzite, undifferentiated	
042.	Arkose	
044.	Breccia	
035.	Sandstone, FG	Sandstone, FG, code 035
038.	Graywacke, FG	
036.	Sandstone, MG	
037.	Sandstone, CG	

METAMORPHIC

055-00.	FG Quartzite, undifferentiated	FG Quartzite, undifferentiated, code 055
055-01.	FG Quartzite, dark gray grading to brown	
055-02.	FG Quartzite, light brown/buff	
055-03.	FG Quartzite, light gray	
055-04.	FG Quartzite, yellowish brown	
055-05.	FG Quartzite, dark red/brown	
055-06.	FG Quartzite, white	
055-07.	FG Quartzite, purple	
055-08.	FG Quartzite, black	
055-09.	FG Quartzite, orange	
056-00.	CG Quartzite, undifferentiated	CG Quartzite, undifferentiated, code 056
056-01.	CG Quartzite, dark gray grading to brown	
056-02.	CG Quartzite, light brown/buff	
056-03.	CG Quartzite, light gray	
056-04.	CG Quartzite, yellowish brown	
056-05.	CG Quartzite, dark red/brown	
056-06.	CG Quartzite, white	
056-07	CG Quartzite, purple	
056-08.	CG Quartzite, black	
056-09.	CG Quartzite, orange	
062.	Schisty Quartzite	
052.	Schist	Metamorphic other, code 063
063.	Meta-igneous fine	
064.	Meta-igneous coarse	

Figure 7.3. Continued

SiO2 VARIETIES

070-03.	Chalcedonic wood, white translucent w/brown striations	Silicified woods, code 072
071-02.	Poorly silicified wood, light brown	
072-00.	Well silicified wood, undifferentiated	
072-01.	Well silicified wood, dark brown	
072-02.	Well silicified wood, light brown	
075-00.	Chalcedony, undifferentiated	Chalcedony, undifferentiated, code 075
075-01.	Chalcedony, light brown, nearly opaque, translucent edges, glossy	
075-02.	Chalcedony, translucent w/numerous red and yellow inclusions	
075-03.	Chalcedony, translucent w/white inclusions predominately w/occasional orange or black inclusions	
075-04.	Chalcedony, translucent w/black inclsuions predominately and occasionally white inclusions	
079-01.	Chert, dark gray w/brown inclusions - may grade to a dark/light banded gray	Franklin Mountains cherts, code 079-01
079-03.	Chert, gray	
079-04.	Chert, tan/gray. Wide banding or mottled	
079-06.	Chert, black	
079-08.	Chert, black w/narrow orange banding	
079-10.	Chert, light brown	
079-11.	Chert, dark brown	
079-00.	Chert, undifferentiated	Chert, undifferentiated, code 079-00
079-02.	Chert, white/cream. May have small black inclusions	
079-05.	Chert, orange/red, glossy	
079-07.	Chert, brown w/white quartz inclusions	
079-09.	Chert, purple, may grade to brown	
079-12.	Chert, red to reddish brown	
078.	Fossiliferous chert	
080.	Jasper	
065.	Quartz crystal, undifferentiated	Other silicates, code 081
081.	SiO2 other	
082.	Fossil bone	
115.	Bone	

MINERALS

090.	Limonite other	Minerals, code 108
097.	Caliche	

Figure 7.3. Continued

the other studies in the El Paso area (for example, O'Laughlin 1980; Carmichael 1982a), the distinction between silicified woods, chalcedonies, and cherts has been maintained in this analysis. It was felt that those distinctions were necessary because these materials can have technologically different flaking properties. Silicified woods sometimes retain portions of their woody structure and may possess better or less well silicified areas within the stone making fracture unpredictable. Chalcedonies may vary in quality and have few or many incipient fractures, crystal vugs, and so forth. In general, chalcedony tends to be a tough stone which requires considerable force application during the flaking process. Cherts vary widely in quality, but in general they tend to be easier to work than chalcedony and are better silicified than some woods. The cherts in this study have been grouped under two codes. Code 079-01 was assigned to cherts that were dark in color (light to dark brown, medium to dark gray, mottled or banded tan and gray, black) and are here termed "Franklin Mountain cherts" because their colors and textures resemble those that originate from strata which are exposed in this mountain range. The terms "Rancheria cherts" and "Lake Valley cherts" (Carmichael 1982a) are not employed here because of the implied association with specific stratigraphic units. Code 079-00, "chert undifferentiated," was assigned to the remaining cherts that did not fit the descriptions for cherts occurring in the Franklin Mountains. It should be noted here that the chert originally coded as 079-07 ("brown with white quartz inclusions" by the field laboratory staff) is the "Laguna chert" described earlier.

The Use of Lithic Raw Materials as Chronologic Indicators

As noted by Carmichael (1982a), Whalen (1977) and Thompson and Beckett (1979) have suggested that the use of a wide variety of "high quality" lithic materials is a characteristic of the earlier prehistoric periods in the El Paso area and that coarser materials increase in later periods (Carmichael 1982a: 87). Table 7.1 lists the percentages of each grouped material type by site for Santa Teresa. Percentages of material classes by isolated manifestations are presented in Table C.1. Looking at only those sites that have been designated as single component, there is some tenuous evidence to support this conclusion when one compares rhyolite versus chert usage. However, it should be noted that the sample sizes for each temporal period are very small. Archaic period sites (LA 49328, 49338, and 49349) exhibit high percentages of both rhyolites and cherts. The assemblage from LA 49328 is dominated by rhyolites (41.8%), whereas cherts constitute 31.0 percent of the stone material on the site. On the other hand, the assemblage at LA 49338 is dominated by chert (30.2%), and if chalcedony and silicified wood are added to this category, the percentage rises to 35.9. Rhyolites make up 24.6 percent of the material at this site. At LA 49349 if rhyolites are compared strictly to the cherts, rhyolites are the dominant materials in the assemblage (25.9%). However, if the chalcedony percentage (9.0) is added to the chert percentage (24.8), the combined silicate category dominates the assemblage. With the exception of LA 49323, all single component Mesilla phase sites exhibit a predominance of rhyolites over cherts and other silicates. The three single-component El Paso sites

Table 7.1

MATERIAL BY SITE

LA#	01	04	09	11	14	17	18	21	22	29	35	36	37	45	55	56	63	72	75	7900	7901	81	108	n=
49317	--	1.6	--	1.6	1.6	23.4	35.9	--	--	1.6	1.6	1.6	--	--	3.1	14.1	--	3.1	7.8	1.6	1.6	--	--	64
49318	5.3	--	--	--	--	40.4	10.5	--	--	--	--	10.5	--	--	7.0	1.8	--	--	--	7.0	17.5	--	--	57
49319	--	--	--	--	--	63.6	--	--	--	--	--	36.4	--	--	--	--	--	--	--	--	--	--	--	11
49320	--	--	--	--	--	16.7	33.3	--	--	--	--	--	--	--	--	--	--	--	--	--	16.7	33.3	--	6
49321	--	--	1.6	--	--	55.7	9.8	--	--	--	3.3	4.9	--	--	4.9	--	--	--	1.6	1.6	16.4	--	--	61
49322	--	3.3	--	--	--	60.7	14.8	--	--	--	1.6	--	--	--	--	--	--	--	6.6	--	13.1	--	--	61
49323	--	2.3	--	--	11.6	12.8	7.0	--	--	--	4.7	5.8	--	--	9.3	2.3	--	--	10.5	16.3	16.3	1.2	--	86
49324	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100.0	--	--	--	1
49325	--	--	--	--	--	36.8	2.6	--	13.2	--	--	13.2	--	--	10.5	--	--	--	--	10.5	13.2	--	--	38
49326	--	--	--	--	--	50.0	9.1	--	--	--	4.5	13.6	4.5	--	--	--	--	--	9.1	--	9.1	--	--	22
49327	--	1.3	--	--	1.3	31.6	15.2	--	1.3	--	5.1	2.5	1.3	--	5.1	2.5	--	--	3.8	10.1	19.0	--	--	79
49328	--	1.8	--	--	3.6	40.0	1.8	--	--	--	--	7.3	--	--	5.5	9.1	--	--	--	5.5	25.5	--	--	55
49329	--	--	--	--	--	8.3	50.0	--	--	--	--	8.3	--	--	16.7	--	--	--	--	8.3	8.3	--	--	12
49330	2.1	2.1	--	--	--	29.2	4.2	--	--	--	6.3	6.3	--	--	16.7	2.1	--	--	6.3	2.1	22.9	--	--	48
49331	--	--	--	--	--	15.8	10.5	--	--	--	5.3	15.8	--	--	5.3	26.3	5.3	--	5.3	5.3	5.3	--	--	19
49332	--	--	--	--	--	61.5	--	--	--	--	--	23.1	--	--	--	--	--	--	--	--	15.4	--	--	13
49333	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
49334	--	--	--	--	--	31.6	10.5	--	--	5.3	--	5.3	--	--	--	--	--	5.3	--	10.5	31.6	--	--	19
49335	--	--	--	40.0	--	20.0	--	--	20.0	--	--	--	--	--	--	--	--	--	--	20.0	--	--	--	5
49336	--	1.9	0.6	--	--	39.1	14.7	--	0.6	1.3	1.3	3.8	3.8	--	1.9	1.9	1.3	--	1.9	5.8	19.9	--	--	156
49337	2.9	--	--	--	--	47.1	5.9	--	--	--	2.9	2.9	--	--	5.9	--	--	--	2.9	8.8	20.6	--	--	34
49338	1.9	--	1.9	--	1.9	20.8	3.8	1.9	--	--	1.9	5.7	--	--	22.6	--	--	1.9	3.8	1.9	28.3	1.9	--	53
49339	--	1.3	0.4	--	--	22.5	21.6	--	1.3	0.4	5.3	4.4	3.1	--	7.9	13.7	--	0.4	0.9	2.6	14.1	--	--	227
49340	--	--	--	--	--	27.2	25.9	--	--	7.4	--	3.7	1.2	--	6.2	3.7	--	--	--	2.5	22.2	--	--	81

Table 7.1, continued

MATERIAL BY SITE

LA#	01	04	09	11	14	17	18	21	22	29	35	36	37	45	55	56	63	72	75	7900	7901	81	108	n=
49341	--	--	--	2.5	--	15.0	25.0	--	2.5	--	2.5	5.0	2.5	2.5	15.0	--	--	--	7.5	--	20.0	--	--	40
49342	4.8	--	--	--	4.8	30.6	--	--	1.6	1.6	1.6	12.9	--	--	11.3	8.1	--	--	3.2	8.1	9.7	1.6	--	62
49343	--	1.1	1.1	--	3.3	40.7	12.1	--	--	--	3.3	5.5	1.1	--	6.6	1.1	--	--	1.1	2.2	20.9	--	--	91
49344	5.7	--	3.4	--	2.3	28.4	8.0	--	1.1	1.1	2.3	1.1	1.1	--	8.0	4.5	--	--	1.1	2.3	29.5	--	--	88
49345	--	--	--	--	4.9	30.5	13.4	--	--	1.2	1.2	7.3	6.1	--	2.4	4.9	--	--	--	7.3	20.7	--	--	82
49346	--	--	--	--	2.0	42.9	12.2	--	--	--	3.1	8.2	2.0	--	12.2	1.0	--	--	2.0	1.0	13.3	--	--	98
49347	3.4	0.9	0.9	--	1.7	25.0	9.5	0.9	2.6	--	5.2	2.6	8.6	--	2.6	9.5	--	0.9	5.2	3.4	17.2	--	--	116
49348	2.3	--	--	--	0.8	27.1	7.5	--	--	0.8	6.8	2.3	1.5	--	12.0	11.3	0.8	0.8	3.8	4.5	18.0	--	--	133
49349	2.2	--	--	--	3.4	7.9	18.0	--	1.1	9.0	3.4	3.4	6.7	--	6.7	4.5	--	--	9.0	12.4	12.4	--	--	89
49350	--	--	--	--	--	24.2	39.4	--	--	--	9.1	3.0	--	--	--	--	--	--	6.1	3.0	15.2	--	--	33
49351	2.9	--	--	--	--	27.2	8.7	--	--	--	1.9	1.0	1.0	-	12.6	3.9	--	1.9	6.8	3.9	26.2	1.9	--	103
49352	0.9	0.9	--	0.9	--	40.6	24.5	--	--	--	2.8	9.4	3.8	--	1.9	0.9	--	0.9	0.9	4.7	6.6	--	--	106
49353	1.1	0.5	0.5	--	2.7	15.4	22.3	--	0.5	12.8	3.2	3.7	2.7	--	3.7	--	0.5	--	3.2	9.6	17.6	--	--	188
49354	--	1.9	--	--	--	66.9	10.4	1.9	--	--	--	1.3	0.6	--	--	2.6	--	--	2.6	3.2	5.8	2.6	--	154
49355	0.9	0.9	0.4	--	1.2	22.2	14.3	0.1	0.3	0.1	4.9	0.6	0.1	0.3	18.7	4.3	0.1	--	3.0	4.3	22.8	0.1	--	670
49356	3.1	1.5	0.8	--	0.8	32.3	5.4	--	0.8	--	1.5	6.9	1.5	--	6.2	6.2	1.5	--	6.2	7.7	17.7	--	--	130
49357	1.8	0.9	--	--	2.1	18.6	13.3	1.2	1.5	--	5.0	10.7	2.4	--	13.9	10.9	0.3	--	0.9	3.0	13.6	--	--	338
49358	0.2	1.2	0.2	0.2	1.9	39.8	4.9	--	0.2	--	0.5	3.0	1.2	--	10.3	5.9	0.2	0.2	2.1	3.7	23.9	0.2	--	427
49359	1.1	--	2.2	--	4.4	30.0	24.4	--	2.2	--	2.2	--	--	--	11.1	4.4	--	--	3.3	4.4	10.0	--	--	90
49360	--	--	2.9	--	2.9	51.4	2.9	--	--	--	--	8.6	8.6	--	--	2.9	--	--	--	2.9	17.1	--	--	35
49361	1.7	--	--	--	0.8	21.5	15.7	--	--	0.8	5.0	6.6	1.7	--	19.8	11.6	3.3	--	0.8	5.0	5.8	--	--	121
49362	--	--	--	--	--	14.1	26.6	--	1.6	--	40.6	4.7	--	--	1.6	--	1.6	--	--	--	9.4	--	--	64
49363	--	--	--	--	--	18.5	22.2	--	--	--	--	3.7	25.9	--	--	3.7	3.7	--	7.4	--	14.8	--	--	27
49364	0.4	0.2	0.4	0.8	1.9	19.0	11.6	0.2	--	--	3.3	5.4	2.7	0.6	10.4	30.8	0.4	0.2	0.4	3.3	7.7	0.2	--	483

Table 7.1, continued

MATERIAL BY SITE

LA#	01	04	09	11	14	17	18	21	22	29	35	36	37	45	55	56	63	72	75	7900	7901	81	108	n=
49365	--	--	2.2	--	--	24.4	22.2	--	--	--	2.2	--	--	--	15.6	17.8	--	--	2.2	4.4	8.9	--	--	45
49366	--	1.3	--	--	--	21.3	13.3	--	--	--	6.7	--	--	--	20.0	8.0	1.3	--	2.7	6.7	18.7	--	--	75
49367	--	--	--	--	--	61.5	--	15.4	--	--	15.4	--	--	--	--	--	--	--	--	--	7.7	--	--	13
49368	--	1.5	--	--	15.4	29.2	10.8	--	--	--	--	13.8	--	--	12.3	--	--	--	3.1	1.5	12.3	--	--	65
49369	1.8	4.5	--	--	0.9	34.8	4.5	--	--	--	5.4	3.6	--	--	22.3	5.4	1.8	--	1.8	8.9	3.6	0.9	--	112
49370	1.6	--	--	--	--	23.8	7.9	--	--	--	--	7.9	1.6	--	3.2	46.0	--	--	--	--	7.9	--	--	63
49371	--	--	--	--	--	15.4	--	--	7.7	--	30.8	15.4	7.7	--	--	--	--	--	--	7.7	15.4	--	--	13
49372	--	0.6	--	--	1.7	34.3	6.3	1.1	3.4	--	--	18.3	1.1	--	12.6	4.6	--	--	0.6	2.9	12.0	--	--	175
49374	--	--	--	--	--	57.1	14.3	2.0	--	--	4.1	6.1	--	--	2.0	4.1	--	--	--	--	10.2	--	--	49
49376	2.7	--	--	--	3.6	34.2	8.1	--	--	2.7	1.8	18.0	--	--	10.8	6.3	--	--	2.7	1.8	7.2	--	--	111
49377	1.8	--	--	--	--	40.4	18.3	0.9	0.9	--	3.7	4.6	--	--	4.6	11.0	--	--	--	2.8	9.2	1.8	--	109
49378	--	--	--	--	--	60.5	2.6	--	2.6	--	--	7.9	--	--	10.5	--	--	--	5.3	--	10.5	--	--	38
49379	--	1.1	--	--	1.1	45.2	18.3	1.1	--	--	--	1.1	1.1	--	2.2	8.6	--	--	3.2	4.3	12.9	--	--	93
49380	--	--	--	--	--	--	23.8	--	--	--	--	4.8	4.8	--	--	4.8	61.9	--	--	--	--	--	--	21
49381	0.5	--	--	--	1.6	39.8	23.6	--	0.5	--	2.1	3.1	0.5	--	6.3	4.2	--	--	2.6	2.1	12.6	--	0.5	191
49382	1.1	1.1	1.1	--	1.1	38.9	5.6	--	--	1.1	7.8	6.7	--	--	6.7	1.1	--	--	1.1	3.3	21.1	2.2	--	90
49383	--	--	--	--	--	25.7	20.2	--	--	--	12.8	2.8	--	--	6.4	20.2	--	--	1.8	1.8	8.3	--	--	109
49384	1.6	--	--	--	2.3	35.2	12.5	--	--	--	7.0	3.9	--	--	10.2	7.0	0.8	--	0.8	1.6	15.6	0.8	--	128
49385	--	--	--	--	0.9	22.0	12.8	--	0.9	--	9.2	5.5	4.6	--	11.0	3.7	0.9	--	--	2.8	25.7	--	--	109
49386	--	--	3.1	--	2.3	28.9	23.4	0.8	--	--	3.9	4.7	0.8	--	1.6	14.1	--	6.3	5.5	--	4.7	--	--	128

Key for Codes to Material Type

01	Tuffs
04	Obsidians
09	Basalts
11	Vesicular Basalts
14	Andesites
17	Fine-grained Rhyolites
18	Coarse-grained Rhyolites
21	Igneous Other Fine-grained
22	Igneous Other Coarse-grained
29	Limestone
35	Fine-grained Sandstone
36	Medium-grained Sandstone
37	Coarse-grained Sandstone
45	Sedimentary Other Coarse-grained
55	Fine-grained Quartzite
56	Coarse-grained Quartzite
63	Metamorphic Other
72	Silicified Woods
75	Chalcedonies
7900	Chert Undifferentiated
7901	Franklin Mountain Chert
81	Other Silicates
108	Minerals

(LA 49335, 49341, and 49377) roughly follow the same pattern except that LA 49335 exhibits equal proportions of rhyolite and chert. This assemblage is actually dominated by andesite (40.0%) of a coarse-grained texture. Accordingly, a general trend towards use of coarser-grained materials in the later periods of occupation is supported by the Santa Teresa data. Carmichael (1982a) had some success in the application of a Lithic Diversity Index to data gathered in the southern Tularosa Basin, which may indirectly reflect this trend. Carmichael (1982a: 87) develops his Lithic Diversity Index as described below.

> In order to measure the degree of variety in high quality flaking material, a Lithic Diversity Index (LDI) was developed (Carmichael 1982). In this area, almost all of the high quality lithic material consists of varieties of chert. The two main exceptions, obsidian and welded tuff, account for relatively small proportions of the lithics recorded. Thus, the assessment of variability in high quality lithics amounts essentially to the measurement of variability in cherts. The index uses the number of chert colors (i.e. different chert varieties) on a site, relative to the number of types of material in the rest of the assemblage. This simple method of recording chert varieties was used because research in the area has not progressed far enough to allow for the actual naming of most chert varieties. It is noted that more than one color variety can be available in the same formation. Thus, selection for material quality, not variety of source locations, is measured. It should be further noted that the index is based on the presence or absence of varieties, not their relative frequencies. The index is designed as follows:

$$\text{LDI} = \frac{\text{number of chert colors}}{\text{total types of lithic material on site}}$$

Using this index, Carmichael (1982a) defined a statistically significant difference in the means for several of the temporal periods in his study area. Paleo-Indian assemblages are separable from Archaic assemblages by the larger mean on the lithic diversity index, a larger mean implying a greater variety of cherts present. Archaic assemblages are separable from Mesilla phase assemblages, again on the basis of the larger mean on the lithic diversity index. Mesilla phase sites, however, could not be distinguished from sites assigned to later phases using the lithic diversity index.

At first glance, this lithic diversity index appears to be a promising tool for the placement of sites with unknown affiliations into a probable temporal period. However, there are several problems involved in the use of the index as formulated. First, it is impossible, given the information provided to accurately reconstruct the material groupings used in the study. The use of the numbers of chert colors as a measure of material "quality" in any assemblage is questionable. In the course of the Santa Teresa lithic analysis, it was noted that the "quality" of cherts placed in single color codes was not constant. A single code might contain not only fine materials free of indications of flaws, but also pieces that exhibited considerable graininess, vugs, incipient fractures, and other flaws that would have made fracture control difficult. The practice of grouping silicified woods and chalcedonies with genuine chert materials may also be questioned on technological grounds as discussed above.

A second problem stems from the fact that, as it is increasingly widely recognized (for example, Kintigh 1984), sample diversity is directly correlated to sample size. A test of this principle was carried out on the Santa Teresa material using the material grouping believed to most closely approximate that of Carmichael. Figure 7.4 shows a strong linear correlation between raw material diversity and site assemblage size. This relationship between density and diversity has also been noted by O'Laughlin (1980).

Another problem involved in the use of the index relates to the use of presence or absence of particular material classes rather than frequencies. This method has the potential for skewing the picture if, for example, an assemblage is encountered in which there are five pieces of chert, all of different colors, but hundreds of flakes of rhyolite or some other material. In such a situation the lithic diversity index, as developed to date, actually obscures the intensity of utilization of the various materials.

Finally, it is clear that the way in which material types are grouped has a significant effect on the computation of individual site indices and consequently, on the mean for any given temporal period. This is illustrated by the present analysis, where two different groupings produced different general trends and significant differences as follows:

Using all of those sites for which temporal assignments have been made (with the exception of LA 49353, which has a mixed Paleo-Indian/Mesilla/El Paso assemblage), two attempts were made to apply the Lithic Diversity Index to the Santa Teresa assemblage using two different groupings of materials. In the first trial, an effort was made to duplicate as closely as possible the material type groups used by Carmichael (1982a), although it was not clear what material type divisions, or varieties of materials other than cherts, were used in his study. Accordingly, the classes used here are a best approximation, the groups identified are shown in Table 7.2.

In the second attempt to apply the Lithic Diversity Index, the material groupings used for data presentation shown in Figure 7.3 were employed (the index in this case was computed as the number of silicate classes present divided by all other materials present on the site). Table 7.3 shows the frequencies, means, standard deviations, and ranges for the temporal groups used in this study.

A series of t-tests was run on the data in Table 7.3 to determine whether there were any statistically significant differences

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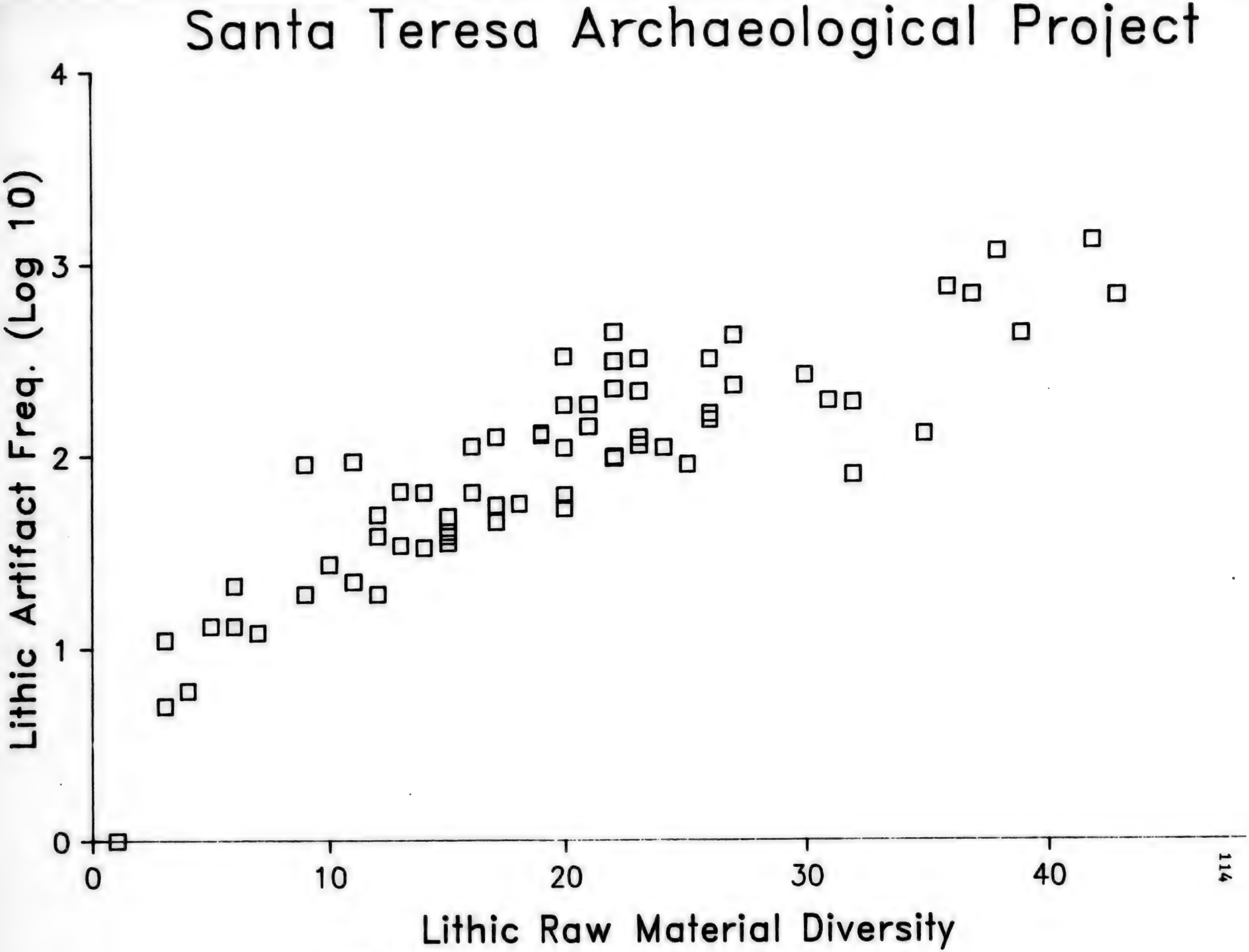

Figure 7.4. Relationship of raw material diversity to artifact frequency.

Table 7.2

Material Groupings Used to Approximate Carmichael's Material Varieties. All codes used here correspond to those in the groups shown in Figure 7.2

001 + 002 + 003 = Tuffs
004-00 to 004-04 = Obsidian, five varieties
007 + 009-00 to 009-02 + 010 = Basalts
013-00 to 013-01 + 014 = Andesites
017-00 to 017-10 = Fine grained rhyolite, eleven varieties
018-00 to 108-09 = Coarse grained rhyolite, ten varieties
012 + 016 + 019 + 021 + 022 + 023 + 024 = Other igneous rocks
029-00 to 029-02 = Limestone
035 + 036 + 037 + 038 = Sandstone
033 + 034 + 041-00 + 042 + 044 = Other sedimentary rocks
055-00 to 055-09 = Fine grained quartzites
056-00 to 056-09 + 062 = Coarse grained quartzites
052 + 063 + 064 = Other metamorphic rocks
065 + 081 + 082 + 090 + 097 + 115 = Other silicates and minerals
075-00 = "Translucent cherts" (e.g. chalcedonies, 070-03)
079-00 = Chert undifferentiated (includes 072-00 and 078)
079-01 = Chert, dark gray w/brown inclusions - may grade to a dark/light banded gray
079-02 = Chert, white/cream, may have small black inclusions
079-03 = Chert, gray
079-04 = Chert, tan/gray - wide banding or mottled (probably a variety of 079-01)
079-05 = Chert, orange/red, glossy
079-06 = Chert, black
079-07 = Chert, brown w/white quartz inclusions
079-08 = Chert, black w/narrow orange banding
079-09 = Chert, purple - may grade to brown
079-10 = Chert, light brown
079-11 = Chert, dark brown
079-12 = Chert, red to reddish brown (includes "jasper")

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Table 7.3

Basic statistical data for the temporal groups used in the two Santa Teresa Lithic Diversity Index (LDI) studies.

Material groups similar to Carmichael's (1982)					Maximum groupings of materials, this report				
Period	n=	mean	s.d.	range	Period	n=	mean	s.d.	range
Archaic	5	.434	.29	.077-.786	Archaic	5	.294	.2	.273-.556
Archaic/ Mixed Ceramic	3	.395	.057	.333-.444	Archaic/ Mixed Ceramic	3	.344	.098	.231-.4
Archaic + Mixed Ceramic	8	.441	.148	.308-.786	Archaic + Mixed Ceramic	8	.363	.102	.231-.556
Archaic/ Mesilla	3	.536	.088	.448-.625	Archaic/ Mesilla	3	.378	.107	.3-.5
Mesilla	12	.378	.129	.167-.571	Mesilla	12	.362	.117	.143-.5
Mesilla/ El Paso	4	.449	.073	.375-.522	Mesilla/ El Paso	4	.286	.064	.231-.375
El Paso	3	.371	.125	.25-.5	El Paso	3	.296	.064	.222-.333
Mixed Ceramic	5	.496	.149	.333-.714	Mixed Ceramic	5	.517	.219	.308-.75

in the means for the different time periods. Only one test, that comparing the Archaic/Mesilla to the El Paso samples in the first trial using the material grouping similar to Carmichael's (1982a), proved to be significant at the 0.05 level ($t=2.17$, for 13 degrees of freedom). When the same differences of means test was performed on the same time periods using the maximum grouping of materials (Trial 2), this test did not prove to be significant at the 0.05 level or beyond ($t=1.70$). If the means for the various time periods are ranked from smallest to largest (reflecting lesser to greater numbers of chert varieties present), there is a very slight tendency for the means to decrease through time in the material type groupings approximating Carmichael's (1982a). In the first trial the Archaic mean is 0.434, that for the Mesilla is 0.378, and that for El Paso is 0.371. It must be kept in mind, however, that the differences between these means are not statistically significant. Applying the Lithic Diversity Index to the second trial grouping of materials, this general trend towards less silicate varieties in later periods is not apparent.

Based on the above discussion, it is here concluded that Carmichael's (1982a) Lithic Diversity Index is not useful for assigning sites of unknown temporal affiliation to a probable temporal period. The individual site indices and consequently the temporal means are controlled in a significant way by the size of the assemblage and the way in which the materials are grouped. The use of the index as presently constructed is also questionable on technological grounds.

The general trend for increasing use of coarse-grained materials in later time periods pointed out by Carmichael (1982a) may well hold true. This trend is supported in a general way by the Santa Teresa data and has been described by other researchers in the Southwest (for example, Acklen and others 1982). However, the lithic diversity index as presently used does not seem to be the most appropriate way to monitor these changes.

Implement Categories

Collection of stone artifacts from the Santa Teresa survey area produced a total sample of 14,958 artifacts. Of this total, 9639 (64.4%) artifacts were subjected to analysis. This sample includes all manuports, all ground stone tools, all cores, all composite tools, all projectile points, all formal flake tools, and utilized flakes. Due to time and personnel constraints, a sample of only 50 pieces of debitage from site contexts with high frequencies of this artifact class were subjected to analysis.

A general breakdown of the collection reveals that of the artifacts analyzed, 536 (5.6%) were manuports; 1821 (18.9%) were fragmentary or whole pieces of ground stone implements; 214 (2.2%) were items placed in the pounding implement categories; 502 (5.2%) were cores; 112 (1.2%) were composite tools; 101 (1.0%) were whole, partial, or fragmentary projectile points; 522 (5.4%) were pieces of stone placed in formal morphofunctional core or flake tool categories; and 5831

(60.5%) were items placed in various debitage categories. In the following section, the various implement classes from the Santa Teresa project will be described.

Implement Category Descriptions

The lithic sort format employed in the analysis of the Santa Teresa Project artifacts was patterned after similar formats used by the Salmon Ruin and Puerco River Projects (Irwin-Williams and Shelley 1980). This sort procedure serves several purposes: (1) to give the basic frequencies of various classes of implements within an assemblage; (2) to provide information on raw material preferences and selection processes; (3) to provide basic information on the lithic reductive system(s); and (4) to channel specific artifacts into higher level analyses. Figure 7.5 presents the basic artifact classes that were employed in the course of the lithic sort. To facilitate data presentation, a number of these artifact classes have been grouped together in Table 7.4, which shows the percentages of the different implement classes for each site. Percentages of implement categories by isolated manifestations are presented in Table C.2. In the following discussion, the first numeric code given refers to the grouped class and the numeric codes given in parentheses within the text refer to the specific subclasses of artifacts that make up the group. Although the code itself includes a somewhat wider range, only those classes of artifacts that appeared in the Santa Teresa Project assemblages will be described.

Manuports

Manuports are here considered to be those pieces of stone that, given their context, must have arrived at the site locality as a result of some facet of human behavior. These items may be unmodified or slightly modified. The manuports recovered from the Santa Teresa Project were grouped together under two codes.

0003. Fire-Cracked Rock (FCR). These are rock specimens that exhibit one or more of the following features: angular or curved breaks not attributable to an effort to control fracture; oxidation; carbonization; or crazing. This category does not include deliberately heat treated materials or artifacts (such as manos) that were subsequently used as cooking stones or as elements in hearth features.

0007. Manuport Other. This grouped class includes the following subclasses: unmodified stones, modified stones, fossils, and concretions. Unmodified stones (Code 0001) are considered to be any material specimen that shows no sign of modification or utilization and cannot be assigned to any other implement category (Lawrence 1980). Such artifacts generally include unmodified cobbles, but can also include exotic material types or oddly shaped stones from specific cultural contexts (for example, caches). When assigning an item to this

IMPLEMENT CATEGORY CODES

Manuports

0001.	Unmodified stone
0002.	Modified stone
0003.	Fire cracked rock
0004.	Fossil
0005.	Pigment
0006.	Crystal
0007.	Manuport other
0008.	Historic
0009.	Concretion

Ground/Pecked Stone

0010.	Cobble mano unshaped
0012.	Cobble mano shaped
0014.	One handed mano
0018.	Two handed mano
0022.	Abrader
0025.	Grinding slab
0026.	Basin metate
0027.	Trough metate
0028.	Shaped stone slab
0029.	Mortar
0030.	Pestle
0032.	Hammerstone
0033.	Pecking stone
0034.	Axe
0038.	Ground stone indeterminate
0039.	Ground stone other
0044.	Ornaments
0045.	Mano form unknown
0046.	Metate form unknown

Cores

0055.	Tested core
0065.	Bifacial core with cortex
0067.	Bifacial core without cortex
0081.	Core with cortex
0082.	Core without cortex
0175.	Tabular core with cortex

Flake/Flake Tools

0112.	Flake type 1
0113.	Flake type 2
0114.	Flake type 3
0115.	Blade
0118.	Biface thinning flake
0119.	Core rejuvenation flake with cortex
0120.	Core rejuvenation flake without cortex
0124.	LILF with cortex
0125.	LILF without cortex
0127.	LAFF with cortex
0128.	LAFF without cortex
0129.	Flake type unknown

Projectile Points

0130.	Clovis
0131.	Folsom
0132.	Plano/Cody
0133.	Jay
0134.	Bajada
0135.	San Jose
0136.	Pelona
0137.	Augustin
0139.	Chiricahua
0144.	Pueblo corner notched
0145.	Pueblo side notched (=Harrell)
0146.	Unknown projectile point type
0200.	Maljamar
0201.	Beckett Type 6
0202.	Beckett Type 7
0203.	Beckett Type 9
0204.	Beckett Type 10
0206.	Beckett Type 5
0207.	Shumla
0208.	San Pedro
0209.	Datil
0210.	Unnamed Type A
0211.	Armijo-like
0212.	Ensor-like

Figure 7.5. Santa Teresa Project Lithic Tool Class Coding Sheet.

Composite Tools

NOTE: For this code, please use the correct combination of the following codes to designate the series of uses the tool has undergone. The use-code for the last use is placed in the left box; the use-code for that use preceding the last use is placed in the second box; and any additional previous uses are placed in the boxes from left to right. For example: the number for a core-chopper-pounder would be 3210, where the last use was pounder, the second to last use was as a chopper, and the first use was as a core.

1. Core
2. Chop
3. Pound
4. Abrade
5. Fire cracked rock
6. Scrape

MORPHOFUNCTIONAL CATEGORY CODES

0150.	Blank
0151.	Preform
0152.	"Knife"
0153	"Drill"
0154.	"Perforator"
0155.	End "scraper"
0156.	Side "scraper"
0157.	End-side "scraper"
0158.	Flake "scraper"
0159.	"Graver"
0160.	"Spokeshave"
0161.	"Utilized flake"
0162.	"Chopper"
0163.	Biface other
0164.	Other morphofunctional category
0165.	Biface form indeterminate
0166.	"Scraper" form indeterminate
0167.	Flake w/grinding/pecking on dorsal face

TECHNOLOGICAL ATTRIBUTES

Note: One of the following codes should be placed in the first box on the form that follows the Implement Category code. Do not use these codes anywhere else on the form.

0 = not retouched or utilized
U = unifacially retouched
V = bifacially retouched
L = utilization damage only

If any item has been heat treated the following code should be placed in the second box after the Implement Category code. Again, do not use this code anywhere else on the form.

T = heat treated

CONDITION STATES

Up to four of the following codes can be entered in the set of four boxes that are to the right of the Technical Attribute code.

W = whole
R = partial
G = fragment
A = altered by analysis
[illegible] = broken
[illegible] = heat altered

Figure 7.5. Continued.

Table 7.4

IMPLEMENT CATEGORY BY SITE

LA#	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n=
49317	6.3	--	--	--	--	1.6	--	--	--	4.7	--	6.3	1.6	1.6	4.7	60.9	4.7	4.7	1.6	--	--	--	1.6	--	64
49318	8.8	1.8	--	3.5	--	--	--	--	--	3.5	1.8	15.8	--	--	12.3	19.3	8.8	3.5	3.5	1.8	12.3	3.5	--	--	57
49319	--	--	--	--	--	--	--	--	--	--	--	36.4	9.1	--	--	18.2	--	9.1	18.2	--	--	--	--	9.1	11
49320	--	--	--	--	--	--	--	--	--	--	--	--	16.7	--	16.7	--	--	33.3	33.3	--	--	--	--	--	6
49321	1.6	1.6	--	--	--	--	--	--	--	1.6	1.6	6.6	4.9	--	16.4	31.1	9.8	1.6	13.1	1.6	6.6	1.6	--	--	61
49322	--	--	--	1.6	--	--	--	--	--	--	--	1.6	3.3	--	8.2	59.0	11.5	--	1.6	1.6	8.2	--	--	3.3	61
49323	11.6	--	--	--	--	--	--	--	--	--	--	14.0	4.7	2.3	5.8	41.9	4.7	4.7	1.2	3.5	2.3	2.3	1.2	--	86
49324	--	--	--	--	--	--	--	--	--	--	--	100.0	--	--	--	--	--	--	--	--	--	--	--	--	1
49325	2.6	--	--	--	--	--	--	2.6	--	--	--	26.3	2.6	--	18.4	21.1	2.6	--	5.3	5.3	10.5	2.6	--	--	38
49326	4.5	--	--	4.5	--	--	--	--	--	9.1	4.5	13.6	9.1	4.5	13.6	13.6	4.5	--	--	9.1	--	--	--	9.1	22
49327	2.5	--	--	--	1.3	1.3	--	1.3	--	2.5	2.5	8.9	2.5	1.3	8.9	29.1	1.3	8.9	2.5	6.3	12.7	3.8	1.3	1.3	79
49328	3.6	--	--	--	--	--	--	--	--	--	1.8	12.7	5.5	5.5	9.1	38.2	10.9	--	--	1.8	7.3	--	1.8	1.8	55
49329	--	--	--	--	--	--	--	--	--	16.7	--	8.3	--	--	33.3	16.7	--	--	--	25.0	--	--	--	--	12
49330	--	--	--	--	--	--	--	--	--	2.1	2.1	18.8	4.2	--	16.7	16.7	12.5	8.3	4.2	8.3	4.2	2.1	--	--	48
49331	--	--	--	--	--	--	10.5	--	--	--	--	26.3	--	--	--	36.8	15.8	5.3	5.3	--	--	--	--	--	19
49332	--	--	--	--	--	--	--	--	--	7.7	--	23.1	7.7	--	--	23.1	7.7	7.7	--	--	15.4	7.7	--	--	13
49333	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
49334	--	--	--	--	5.3	--	--	--	--	10.5	--	--	--	--	10.5	31.6	5.3	5.3	10.5	15.8	5.3	--	--	--	19
49335	20.0	--	--	--	--	20.0	--	40.0	--	--	--	--	--	--	--	20.0	--	--	--	--	--	--	--	--	5
49336	4.5	--	0.6	1.9	--	--	0.6	0.6	--	--	--	22.4	5.8	1.3	16.0	21.2	9.0	1.3	1.9	1.3	5.8	2.6	--	3.2	156
49337	--	--	--	2.9	--	--	--	--	--	2.9	--	2.9	2.9	--	5.9	17.6	32.4	11.8	11.8	--	2.9	2.8	2.9	--	34
49338	11.3	1.9	--	--	--	--	--	--	--	--	--	24.5	3.8	--	3.8	24.5	5.7	1.9	5.7	3.8	3.8	--	7.5	1.9	53
49339	10.6	1.3	0.4	3.1	--	5.7	0.4	2.2	0.4	2.6	0.4	24.7	5.7	0.9	5.7	15.0	10.1	3.5	1.3	0.4	1.3	0.9	0.9	2.2	227
49340	1.2	--	--	--	--	3.7	1.2	--	--	2.5	--	7.4	7.4	2.5	8.6	24.7	21.0	8.6	6.2	1.2	--	--	2.5	1.2	81

Table 7.4, continued

IMPLEMENT CATEGORY BY SITE

LA#	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n=
49341	--	--	--	2.5	--	--	5.0	5.0	--	--	--	7.5	5.0	--	2.5	42.5	12.5	--	5.0	--	12.5	--	--	--	40
49342	4.8	--	--	--	--	--	--	--	--	1.6	1.6	29.0	3.2	4.8	9.4	24.2	8.1	--	3.2	--	8.1	--	--	1.6	62
49343	3.3	1.1	--	--	--	--	--	1.1	--	1.1	1.1	18.7	3.3	5.5	8.8	17.6	2.2	4.4	3.3	7.7	15.4	--	4.4	1.1	91
49344	2.3	--	--	--	--	--	--	1.1	--	3.4	1.1	22.7	1.1	--	13.6	23.9	12.5	4.5	4.5	2.3	5.7	--	--	1.1	88
49345	3.7	--	--	--	--	--	--	2.4	--	1.2	--	13.4	6.1	1.2	17.1	26.8	7.3	9.8	4.9	3.7	2.4	--	--	--	82
49346	3.1	--	2.0	1.0	--	--	2.0	--	--	5.1	--	18.4	6.1	3.1	13.3	26.5	9.2	4.1	4.1	--	1.0	--	--	1.0	98
49347	6.0	3.4	--	--	--	--	--	1.7	--	2.6	0.9	22.4	7.8	1.7	6.0	14.7	7.8	11.2	5.2	0.9	0.9	3.4	1.7	1.7	116
49348	9.0	--	--	1.5	0.8	0.8	3.8	0.8	--	3.8	0.8	24.1	7.5	1.5	1.5	18.0	9.0	2.3	6.0	3.8	3.8	0.8	0.8	--	141
49349	9.0	--	--	--	--	--	1.1	3.4	--	3.4	1.1	6.7	9.0	--	10.1	31.5	4.5	10.1	5.6	1.1	1.1	1.1	1.1	--	89
49350	--	--	--	3.0	--	--	--	--	--	9.1	--	9.1	6.1	--	33.3	9.1	12.1	9.1	3.0	6.1	--	--	--	--	33
49351	1.9	3.9	1.0	--	--	1.0	--	1.0	--	1.9	--	6.8	1.0	1.0	4.9	35.9	12.6	9.7	7.8	1.0	3.9	1.9	1.0	1.9	103
49352	4.7	0.9	--	0.9	--	--	--	--	--	1.9	1.9	13.2	4.7	--	3.8	27.4	18.9	4.7	10.4	1.9	2.8	--	0.9	0.9	106
49353	0.5	1.1	0.5	--	--	--	--	0.5	0.5	--	0.5	11.2	0.5	--	17.6	43.6	17.0	1.1	0.5	1.6	--	1.6	1.1	0.5	188
49354	3.9	2.6	--	--	--	--	--	--	--	--	--	7.1	3.2	--	5.8	43.5	16.9	6.5	1.9	3.9	1.9	--	2.6	--	154
49355	1.5	2.2	0.3	0.7	--	1.3	0.9	0.4	--	0.7	--	3.7	1.3	0.3	12.7	31.9	20.4	7.3	8.1	1.0	3.6	0.1	0.1	1.0	670
49356	1.5	2.3	--	0.8	--	--	0.8	1.5	--	1.5	--	12.3	--	--	16.2	23.1	15.4	3.1	3.1	6.2	8.5	3.1	--	0.8	130
49357	16.3	1.5	1.5	1.5	--	1.5	2.4	--	--	1.5	0.9	29.0	5.6	5.0	6.5	14.2	4.7	1.2	0.9	--	0.6	1.2	0.6	3.6	338
49358	--	0.7	0.7	0.9	--	0.2	0.2	0.5	--	0.7	--	6.8	0.2	--	10.8	25.1	23.7	7.7	6.1	3.7	10.1	0.7	1.2	--	427
49359	10.0	--	--	--	--	--	--	--	--	1.1	--	21.1	3.3	2.2	6.7	18.9	7.8	13.3	11.1	--	3.3	--	1.1	--	90
49360	--	--	--	2.9	--	--	--	2.9	--	2.9	--	11.4	2.9	--	17.1	31.4	8.6	8.6	--	--	5.7	--	--	5.7	35
49361	14.1	2.5	--	1.7	0.8	--	--	1.7	--	4.1	--	33.9	8.3	2.5	6.6	24.0	--	4.1	1.7	0.8	--	0.8	--	2.5	121
49362	10.9	4.7	4.7	1.6	--	--	--	1.6	--	--	--	12.5	--	--	18.8	21.9	7.8	7.8	3.1	1.6	3.1	--	--	--	64
49363	7.4	--	7.4	3.7	--	7.4	--	--	--	3.7	--	14.8	33.3	7.4	--	3.7	--	--	--	--	--	7.4	--	3.7	27
49364	3.1	1.0	0.8	1.4	--	8.5	2.1	3.1	1.9	6.4	0.4	36.2	7.7	1.7	3.1	11.6	0.8	1.9	2.5	0.8	1.9	0.6	0.6	1.9	483

Table 7.4, continued

IMPLEMENT CATEGORY BY SITE

LA#	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n=
49365	6.7	--	2.2	--	--	2.2	--	4.4	--	17.8	2.2	4.4	2.2	--	15.6	6.7	8.9	20.0	4.4	2.2	--	--	--	--	45
49366	6.7	--	--	--	--	--	1.3	1.3	--	--	1.3	12.0	4.0	2.7	14.7	21.3	2.7	8.0	9.3	5.3	9.3	--	--	--	75
49367	--	--	--	--	--	--	--	--	--	--	--	23.1	7.7	--	15.4	23.1	7.7	15.4	7.7	--	--	--	--	--	13
49368	3.1	6.2	--	--	--	--	--	--	--	1.5	--	9.2	1.5	--	15.4	27.7	6.2	4.6	7.7	3.1	13.8	--	--	--	65
49369	2.7	--	--	--	--	0.9	0.9	0.9	--	2.7	--	25.0	5.4	2.7	9.8	26.8	--	8.0	8.0	0.9	4.5	--	--	0.9	112
49370	1.6	--	1.6	--	--	--	--	--	--	1.6	--	12.7	--	--	3.2	31.7	11.1	9.5	20.6	1.6	3.2	--	--	1.6	63
49371	--	--	--	--	7.7	--	7.7	7.7	--	--	--	38.5	15.4	--	--	--	--	--	--	15.4	7.7	--	--	--	13
49372	6.9	--	--	--	--	--	--	--	--	4.6	2.3	33.7	6.3	2.9	7.4	15.4	6.9	--	--	1.7	6.9	1.1	0.6	3.4	175
49374	--	--	2.0	2.0	--	--	--	--	--	6.1	--	4.1	10.2	--	4.1	36.7	12.2	4.1	14.3	4.1	--	--	--	--	49
49376	4.5	2.7	--	--	--	--	--	--	--	1.8	--	31.5	7.2	--	11.7	26.1	2.7	--	0.9	1.8	7.2	0.9	--	0.9	111
49377	--	--	--	0.9	--	--	--	0.9	--	0.9	0.9	14.7	2.8	--	11.9	15.6	5.5	15.6	10.1	9.2	4.6	--	--	6.4	109
49378	2.6	2.6	--	--	--	--	--	--	--	5.3	--	10.5	--	--	13.2	21.1	18.4	--	--	--	26.3	--	--	--	38
49379	9.7	--	--	--	--	--	--	2.2	--	8.6	--	6.5	6.5	2.2	8.6	29.0	10.8	4.3	7.5	--	1.1	1.1	1.1	1.1	93
49380	--	--	--	--	--	--	--	--	--	4.8	--	57.1	--	--	--	14.3	--	14.8	9.5	--	--	--	--	9.5	21
49381	0.5	2.1	--	--	--	--	1.6	0.5	--	1.0	1.6	7.3	2.1	0.5	14.1	26.6	11.5	3.7	3.7	3.1	7.3	--	0.5	2.1	191
49382	5.6	2.2	--	--	--	--	--	--	--	1.1	--	13.3	7.8	2.2	13.3	32.2	5.6	--	--	2.2	12.2	--	1.1	1.1	90
49383	13.8	0.9	--	--	--	--	--	1.8	--	4.6	--	20.2	3.7	--	8.3	20.2	9.2	4.6	11.0	0.9	--	--	--	0.9	109
49384	16.4	2.3	--	0.8	--	--	--	--	--	7.0	0.8	20.3	4.7	--	7.8	18.8	9.4	3.1	3.1	0.8	3.1	0.8	--	0.8	128
49385	10.1	--	--	1.8	--	--	--	--	--	--	--	25.7	3.7	3.7	2.8	23.9	3.7	1.8	6.4	--	12.8	--	0.9	2.8	109
49386	3.1	--	--	0.8	--	--	0.8	2.3	--	3.1	--	24.2	8.6	0.8	10.9	18.8	3.9	7.0	9.4	0.8	1.6	1.6	--	2.3	128

Key for the Codes to Implement Categories

0003	Fire Cracked Rock
0007	Manuport Other
0010	Cobble Mano
0014	One Handed Mano
0018	Two handed Mano
0025	Grinding Slab
0026	Basin Metate
0027	Trough Metate
0030	Pestle
0032	Pounding Implements
0034	Groundstone Other
0038	Groundstone Indeterminate
0081	Core w/cortex
0082	Core w/o cortex
0112	Flake Type 1
0113	Flake Type 2
0114	Flake Type 3
0124	LILF w/ cortex
0125	LILF w/o cortex
0127	LAFF w/ cortex
0128	LAFF w/o cortex
0129	Flake Type Other/unknown
0200	Projectile Points
1000	Composite Tools

category particular attention was given to its context and the potential for it having arrived on the site by natural rather than cultural processes. A modified stone (Code 0002) is considered to be any material specimen that exhibits minimal modification in the form of grinding, pecking or flaking and cannot be assigned with confidence to any other implement category. Fossils (Code 0004) are the remains or traces of animals or plants that have been preserved by the replacement of the organism with rock or mineral substances. These are sometimes kept by people even today as oddities. Concretions (Code 0009) are rocks that consist of substances precipitated from solution, that collect around a nucleus enclosed by some sedimentary rock of a different composition. Because the precipitates fill interstitial spaces in the rock, concretion shapes can be quite eccentric and may have been kept as oddities by prehistoric peoples.

Ground Stone and Pecked Stone

The second broad class of artifacts to be considered are those items whose final forms were achieved through a process of grinding or pecking. The evidence of grinding or pecking may be the result of deliberate efforts at production or utilization damage, or both. Ground-pecked stone artifacts from the Santa Teresa Project have been grouped under the following categories.

0010. Cobble Manos. This class includes two subclasses: unshaped forms and shaped forms. Unshaped forms (Code 0010) are frequently ovoid river cobbles that exhibit one or two flat or convex ground facets but are otherwise unmodified. When two ground facets are present, these oppose each other. Striations tend to be rather coarse, although specimens with fine striations and highly polished facets are sometimes found. Some items exhibit pitting on the ground surface which was the result of pecking in an effort to retooth the surface and facilitate further grinding with the implement. Occasionally, artifacts in this class exhibit light pecking as a result of battering along one or more ends or edges from using the tool as a pounding implement. Shaped forms (Code 0012) are similar to unshaped forms except that the edges and ends of the cobble have been moderately to heavily pecked to fashion the artifact into a more regular shape when viewed in plan view, perhaps for greater comfort in handling. Striations and polish sometimes lap over onto the pecked surfaces. Examples of these artifacts from the Santa Teresa Project are shown in Figure 7.6.

O'Laughlin (1980) illustrates two cobble manos fashioned from quartzite that are similar to those in the Santa Teresa collection. Cobble manos in the Santa Teresa collection were most frequently fashioned from cobbles of sandstone (33.3%). This is somewhat at odds with O'Laughlin's (1980) data, and two factors may be responsible: (1) the sandstones may actually have been fine-grained quartzite that were misidentified, or (2) the manos fashioned from this material may actually have been one-hand forms. The next most popular materials from which these artifacts were fashioned are andesite and coarse-grained rhyolite, both which occur at about 10.3 percent.

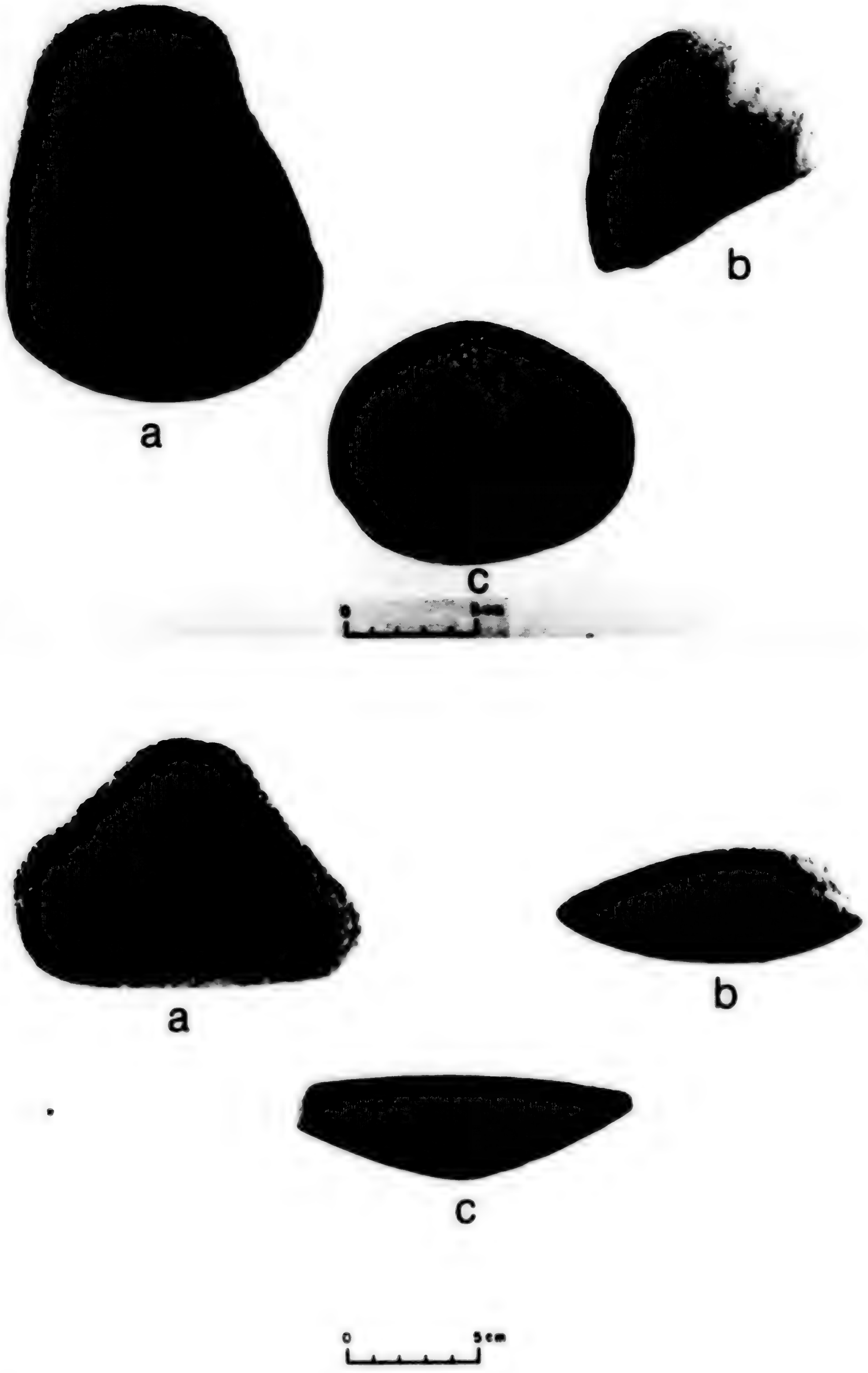


Figure 7.6. Cobble manos, plan view and cross section. *a*, 30S/39W, SN 364; *b*, LA 49381A, SN 150; *c*, 26S/39W, SN 363.

0014. One-Hand Mano. This is a grinding implement whose shape in plan view is rectangular to oval, and whose size is suitable for manipulation with one hand. These artifacts sometimes exhibit evidence of intentional shaping in the form of flake scars or pecking along the edges. Most commonly, these artifacts possess one ground surface or two opposed ground surfaces. Grinding surfaces frequently show pitting associated with attempts to refurbish the implement. Such manos with one or two convex ground surfaces are commonly associated with the use of trough metates in the Southwest (Woodbury 1954: 78-79). Examples of this artifact class are shown in Figure 7.7.

O'Laughlin (1980) illustrates two manos manufactured from sandstone. In the Santa Teresa collection the favored material from which these artifacts were fashioned was sandstone (81.3%). The next most frequently utilized material is fine grained quartzite (5.3%).

0018. Two-Hand Mano. These artifacts are similar to one hand manos except that they are larger and were probably intended for use with two hands. A variety of cross sections are produced through use, although the most common cross section observed on the Santa Teresa fragments is aerofoil (two adjacent ground surfaces opposed by two additional adjacent ground surfaces). These artifacts are most frequently associated with slab metates used during the later Puebloan occupations in the northern Southwest (Woodbury 1954: 68-77). These artifacts do not appear to be prevalent in the El Paso area and do not occur with great frequency in the Santa Teresa collection. However, Lehmer (1948: 32, Plate IXa) does illustrate one such artifact. Five of the six Santa Teresa artifacts were fashioned from sandstone and one was produced from a piece of rhyolite.

0025. Grinding Slabs. The form described here represents the beginning stage of a continuum that, depending upon the grinding motion used, will result in one of two final forms. These ground stone implements are generally large boulders or slabs, sometimes deliberately shaped by flaking, pecking, grinding, or a combination of these techniques, that possess one or two relatively flat, ground facets. Where two ground surfaces are present, they oppose each other. After prolonged use with a grinding motion oriented parallel to the long axis of the piece, an elongated depression will develop. When the grinding motion is rotary (circular), a rounded depression typical of the basin metate (Code 0026) will develop after considerable use. Those artifacts that exhibited a flat ground facet or a shallow elongated depression were sorted under Code 0025 (for example, Figure 7.8). The favored materials for production of this kind of artifact are fine-and-coarse grained quartzites (25.3% and 37.4%, respectively). This preference is also evidenced by the presence of quantities of debitage with grinding and pecking on the dorsal face. The next most frequently employed material is sandstone (22.0%).

0026. Basin Metate. Those implements that exhibited a rounded depression and stria suggestive of a rotary grinding motion were sorted under this code. One whole grinding slab was recovered, but the majority of the artifacts placed in both this and the basin metate class were fragments, many of which exhibit evidence of pecking on the ground

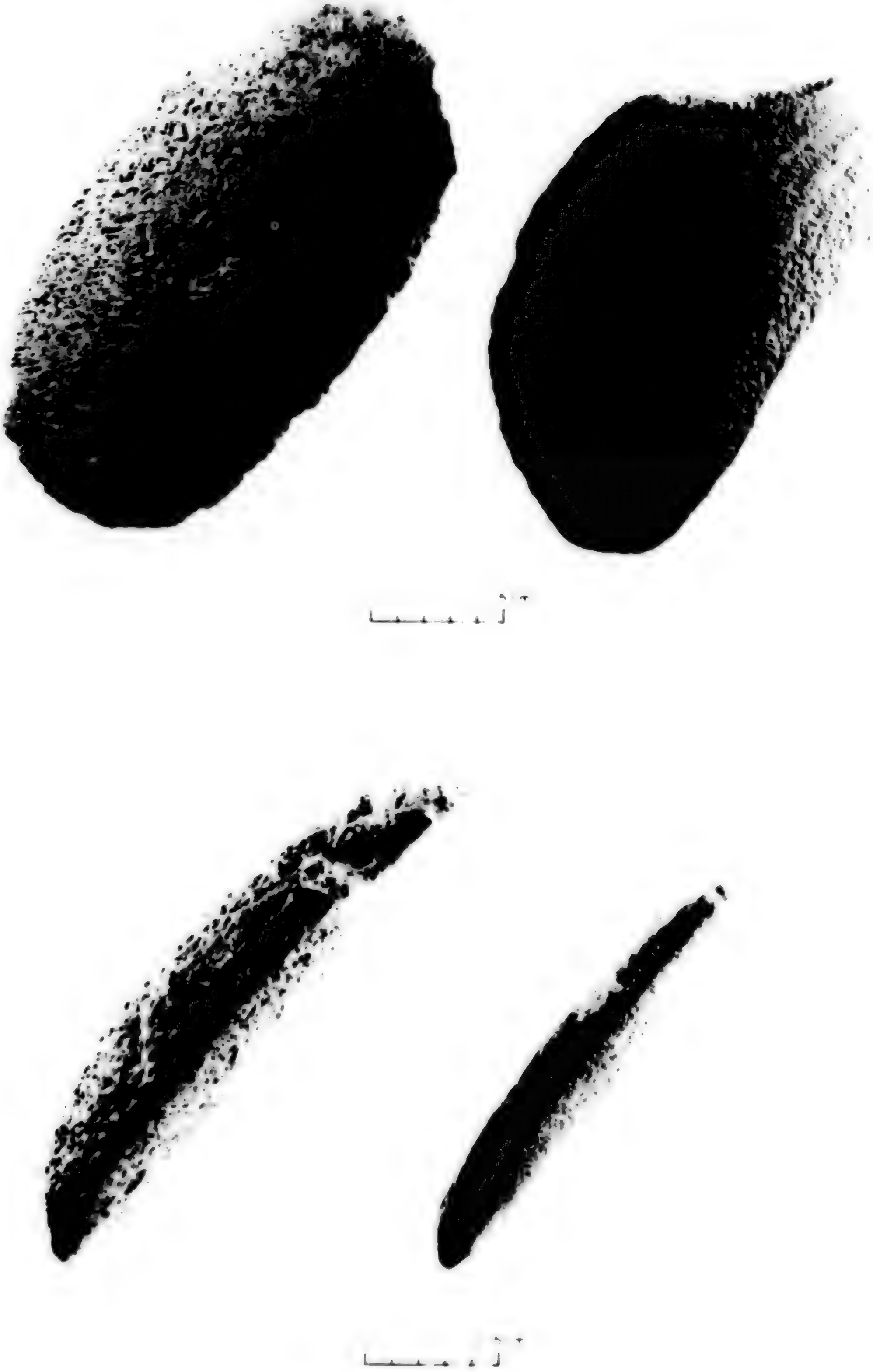


Figure 7.7. One-hand manos. Both artifacts are from LA 49356A, SN 263.

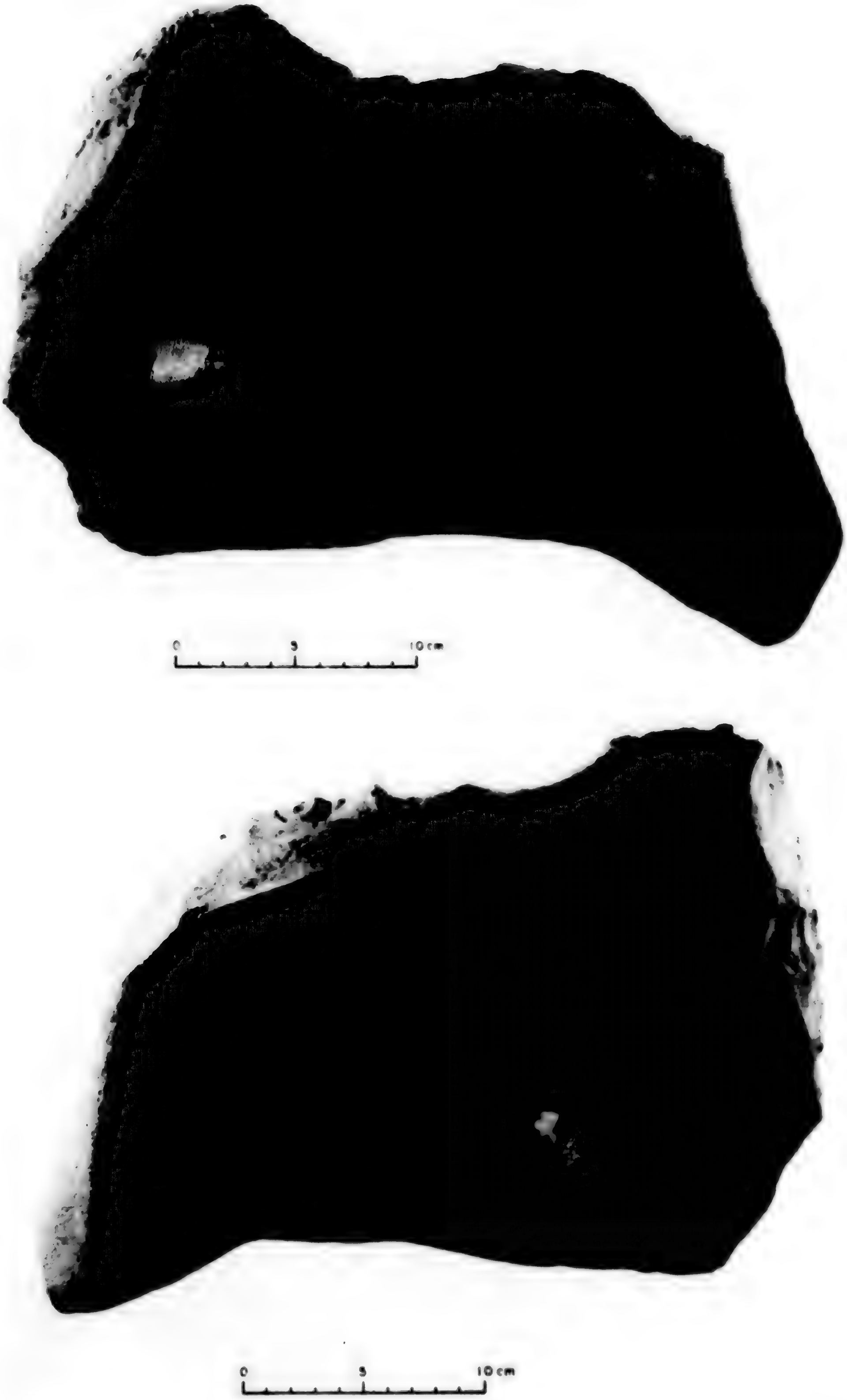


Figure 7.8. Slab metate, obverse and reverse views. LA 49352, SN 046.

surface as a result of retoothing. The favored material used in the manufacture of this metate form are sandstones of varying coarseness and coarse fabric (porphyritic) rhyolite (6.8%).

0027. Trough Metate. These artifacts are large slabs or boulders that possess a deliberately manufactured depression produced through flaking, pecking, and grinding, or a combination of these techniques. There are several forms of trough metates: closed at both ends, open at one or both ends, open or closed with a small shelf at one end, and so forth. The most common form in the El Paso area is the open ended shallow trough (O'Laughlin 1980). The depression itself may exhibit one or more steps along the long axis. No stepped forms were noted in the Santa Teresa assemblages; all such implements possessed a simple, deep trough like the one shown in Figure 7.9. The material most frequently employed in the production of the Santa Teresa trough metates is sandstone of varying coarseness (57.3%). The next preferred material is porphyritic rhyolite (11.0%). Fine-grained quartzite (8.5%) and coarse-grained quartzite (7.3%) were also used. All other materials occur in frequencies of less than 5 percent.

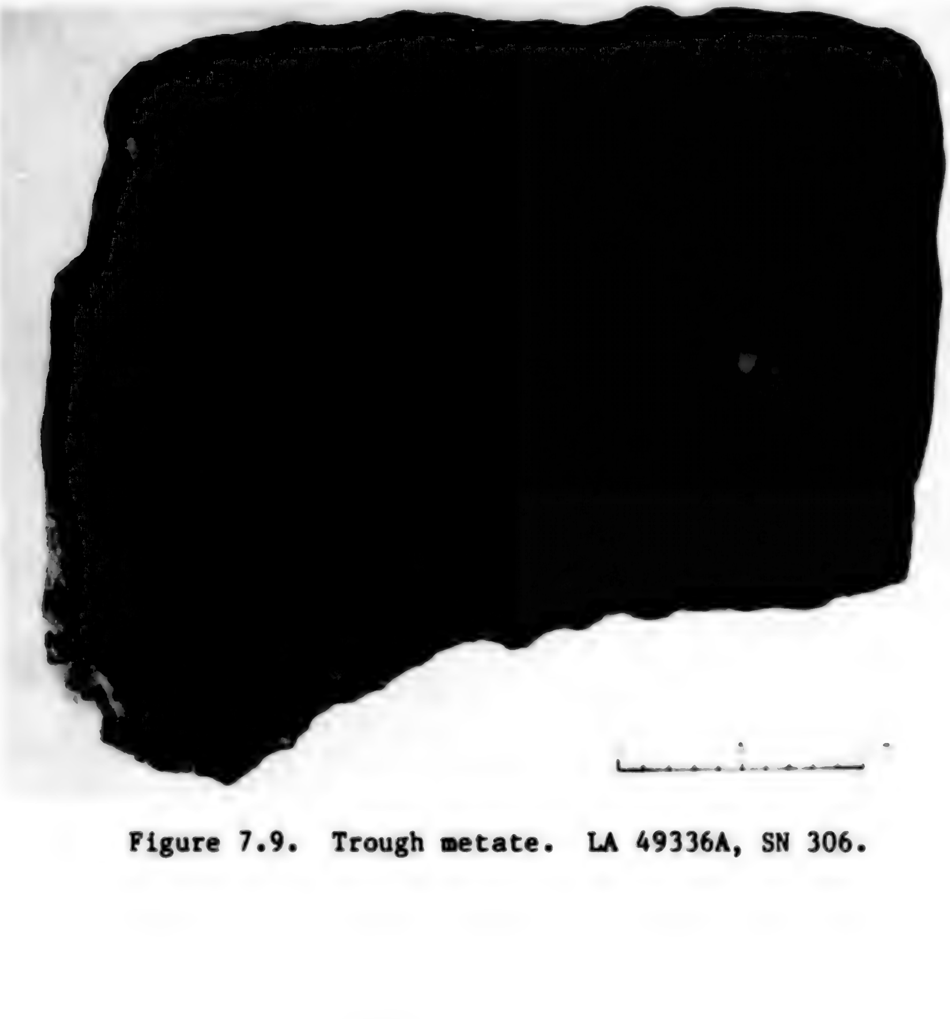


Figure 7.9. Trough metate. LA 49336A, SN 306.

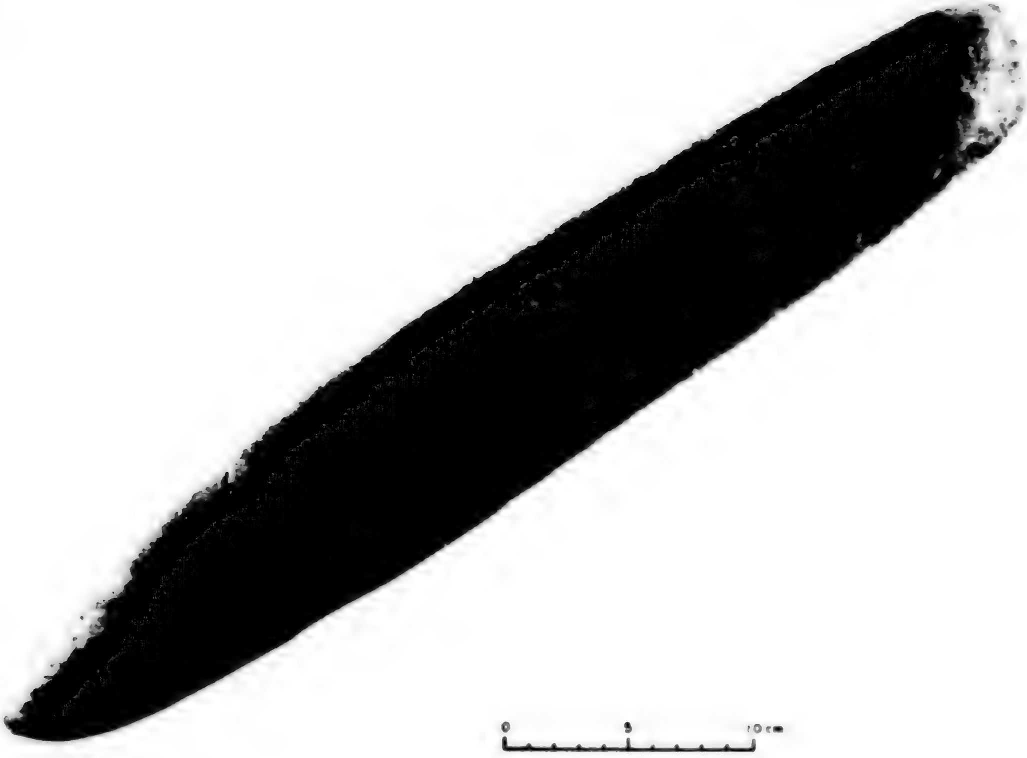
Cosgrove (1947) notes that trough metate forms occurred with the greatest frequency at late period Pueblo sites. Lehmer (1948) found trough metate forms most frequently associated with El Paso phase sites. However, O'Laughlin (1980) feels that very little is really understood about the temporal distribution of ground stone artifacts. He notes that trough or open ended basins are characteristic of the Late Formative period in the El Paso area.

0030. Pestle. These artifacts are usually cylindrical or, less frequently, rectangular stones that have rounded or faceted ends that exhibit fine to coarse striations and pitting from use. Size is highly variable as depicted by the example in Figure 7.10 and the second example shown in Figure 7.14a. These implements are commonly used with a mortar, although no stones of this type were recovered during the Santa Teresa survey.

The small pestle recovered may have been used to grind herbs or perhaps pigments. Artifacts like the large pestle are commonly associated with mesquite processing in the El Paso area (for example, Brethauer 1977; O'Laughlin 1980; Carmichael 1982a). Mortar and pestles are used in processing the seeds and pods because, at least among the Papago, they are considered to be too sticky to grind on a metate (Bell and Castetter 1937).

0032. Pounding Implements. This category includes two subclasses of artifacts, hammerstones (Code 0032) and pecking stones (Code 0033). Hammerstones are thought to be utilized in the manufacture of flaked stone tools, whereas pecking stones were utilized in the production and refurbishing of ground stone implements. Woodbury (1954) notes that in the northern Southwest tough siliceous stones such as chert were preferred for use as pecking stones, although hammerstones were most frequently fashioned of grainy materials such as quartzite. However, in the course of the analysis of the Santa Teresa materials, it was noted that the distinction between the two artifact classes was not clear. Artifacts of both classes are commonly called hammerstones in the El Paso area (O'Laughlin 1980; Bradley 1983). In order to overcome potential problems in misclassification, the two implement classes are here combined under the hammerstone code. In general, these artifacts are small-to-medium sized, rounded to subrectangular stones of varying shape. The most frequently employed materials are coarse-fabric rhyolite (45.8%), fine-fabric rhyolite (29.4%), fine- and coarse-grained quartzites (7.5% each), and Franklin Mountain chert (3.3%). Use related phenomena vary with the degree of utilization of the tool and range from concentrations of ring cracks and slight pitting to concentrated pitting, numerous nicks, cuts, and random flake removals terminating in step and hinge fractures. Occasionally, coarse striations are observed where the artifact was used to abrade the platform surfaces of cores or the edges or faces of ground stone implements. Two artifacts of this class are shown in Figure 7.11 (d and f).

0038. Indeterminate Ground Stone. This grouped class includes three subclasses: indeterminate ground stone, mano form unknown, and metate form unknown. Indeterminate ground stone (Code 0038) is any piece of stone that exhibits one or more ground facets that cannot, with



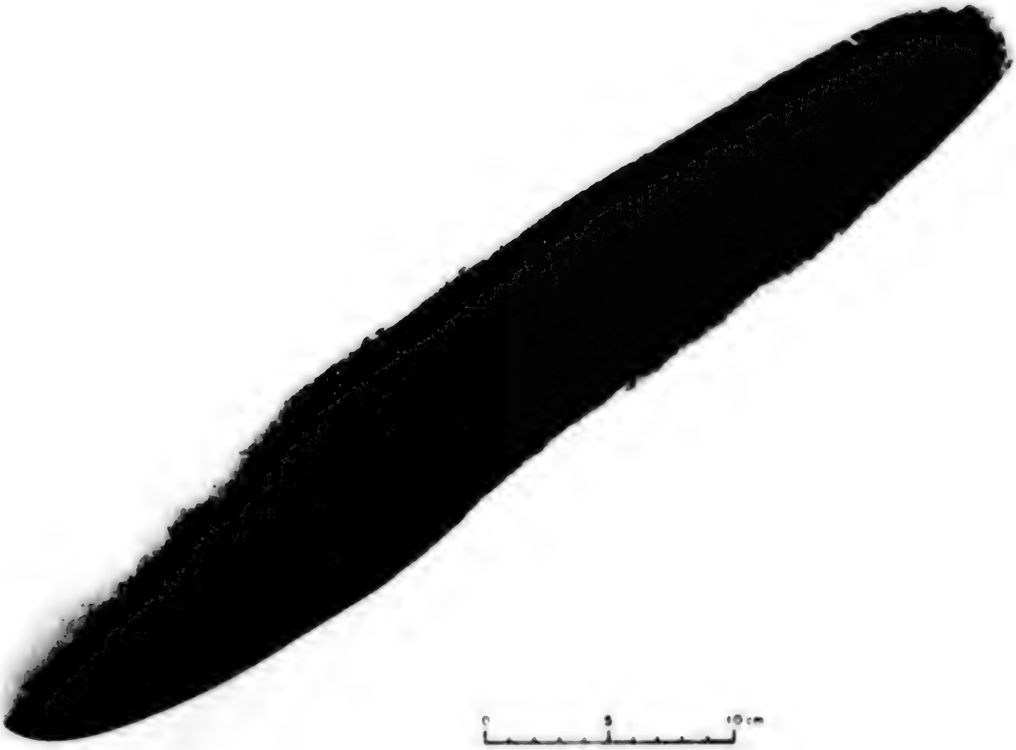
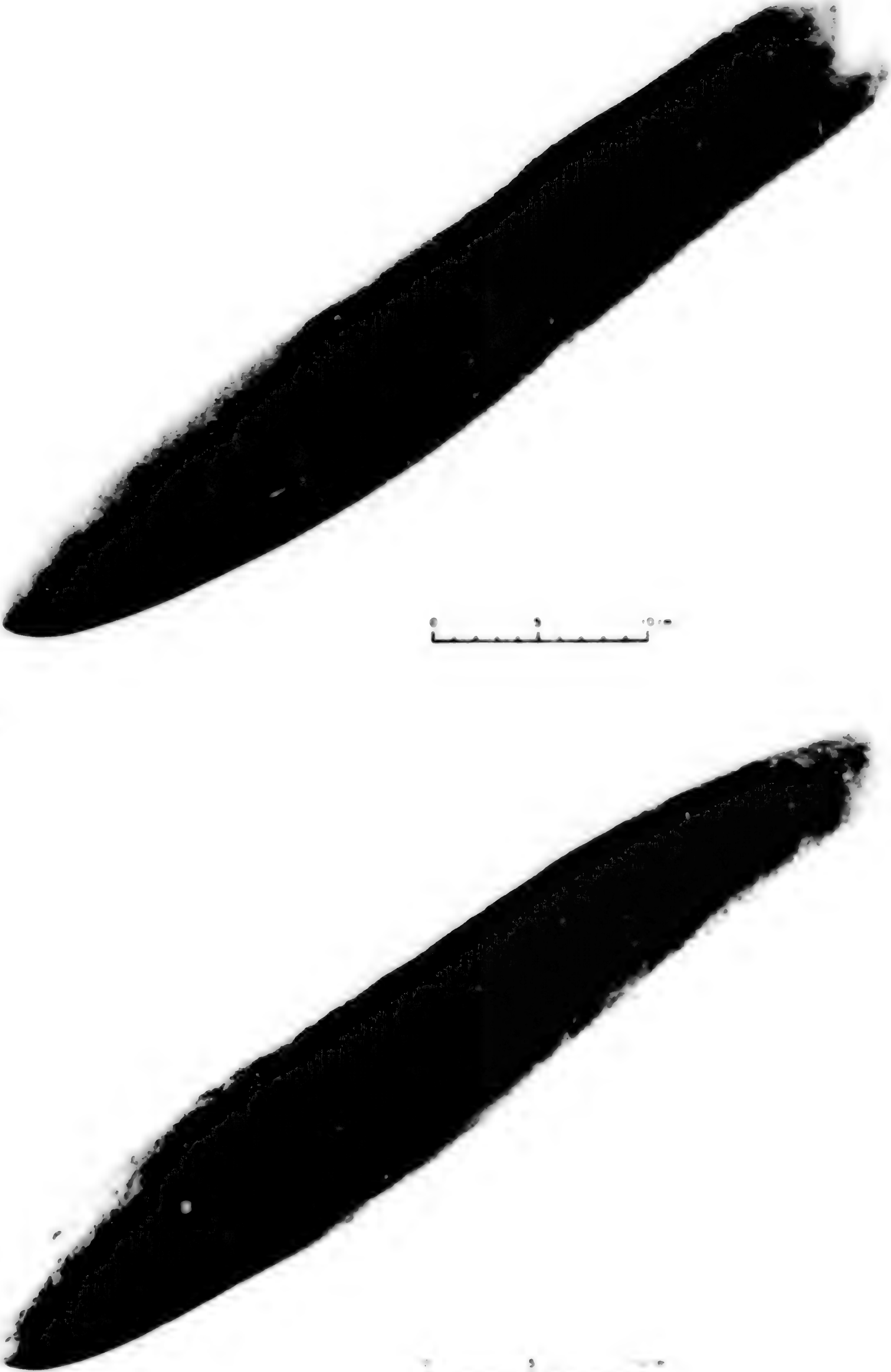


Figure 7.10. Large pestle. Four views, note waisting. Isolated artifacts, 39S/09W, FN 5188.

Figure 7.10 (continued) Large Pestle. Four views, note waisting. Isolated artifacts, 39 S/09W, FN5188.



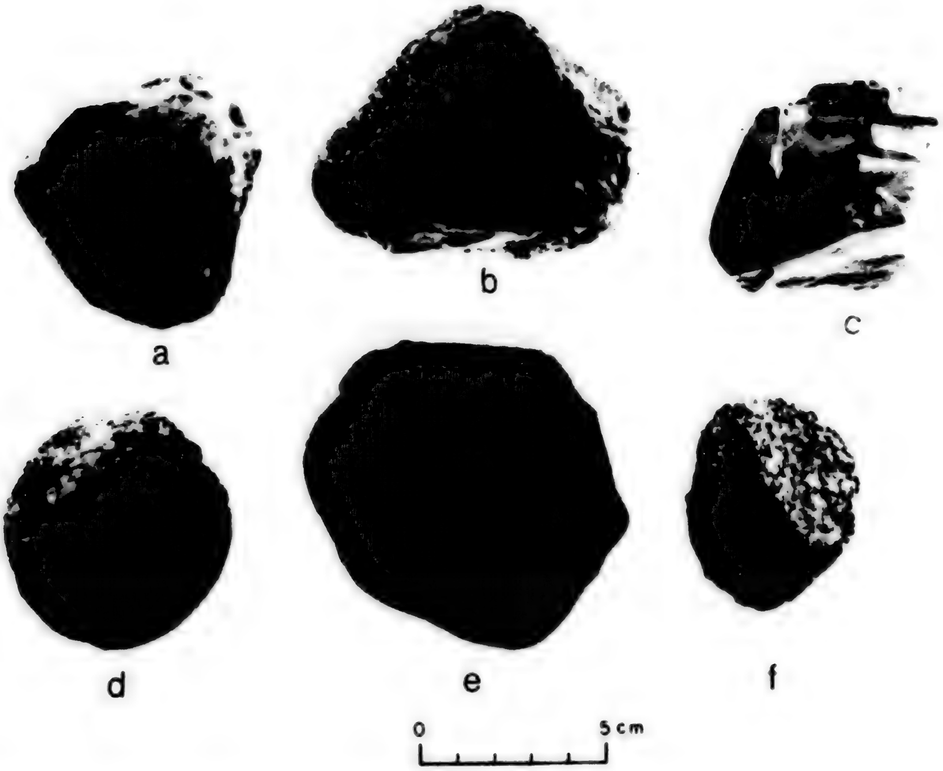


Figure 7.11. Pounding implements and composite core tools. a-c, e, composite tools; d and f, pounding implements.

confidence, be assigned to any other ground stone category. Ground stone artifacts that were too fragmentary for accurate identification were recorded under this code. Artifacts that possessed a convex ground facet but were too fragmentary to be assigned to a specific mano category were classified as mano, form unknown (Code 0045). Artifacts that exhibited a concave ground facet, but could not be assigned to a specific metate class because of their fragmentary nature were assigned to the metate, form unknown category (Code 0046).

0039. Ground Stone Other. This category includes any piece of ground or pecked stone for which a specific category was not provided. Included here are shaped stone slabs, for example, slabs of stone that possess evidence of flaking along their margins and perhaps light grinding or pecking on their flat surfaces, that may have functioned as hearth liners, liners or caps for storage pits, and so forth. Also included here are palletes (Fig. 7.12); concave-convex manos (Fig. 7.13), which represent metate fragments that have been reutilized as manos; and a fragment of a pipe bowl (Fig. 7.14b); what is thought to be a gaming piece (Fig. 7.14c); sandstone balls (Fig. 7.14d); and an abrader (Fig. 7.14e).

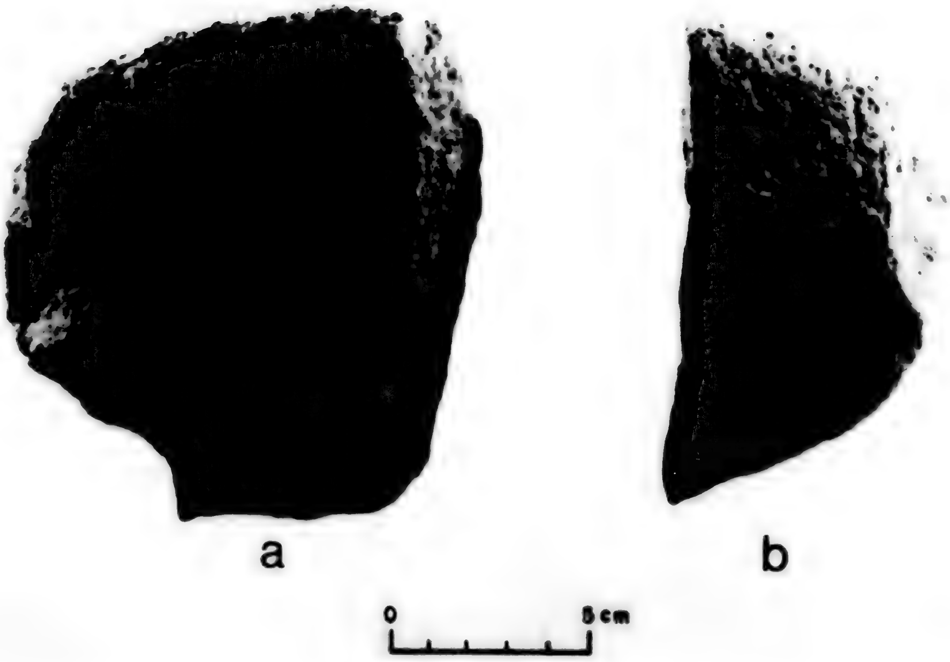


Figure 7.12. Pallettes. a, LA 49381A, SN 105; b, LA 49352, SN 046.

Flaked Stone

The third broad class to be described here are flaked stone artifacts. It is appropriate to consider first several subclasses of cores and the products and by-products of core reduction. This is followed by a description of formal and informal flake tools.

Cores

0081. Core with Cortex. Cores are the objective pieces from which flakes have been removed (Crabtree 1972). Given this broad definition, any artifact that exhibits one or more negative flake scars could theoretically be called a core. However, here cores are defined as those nuclei that possess at least one platform surface from which flakes of a suitable size have been derived, and that may later be fashioned into formal tools (such as projectile points) or may serve as expedient flake tools. This definition serves to eliminate late stage bifaces from the core category. The larger class of cores with cortex contains four subclasses of artifacts: assayed or tested cores, bifacial cores with cortex, other cores with cortex, and tabular cores with cortex. Assayed (Pippin 1984) or tested cores (McDonald 1980;

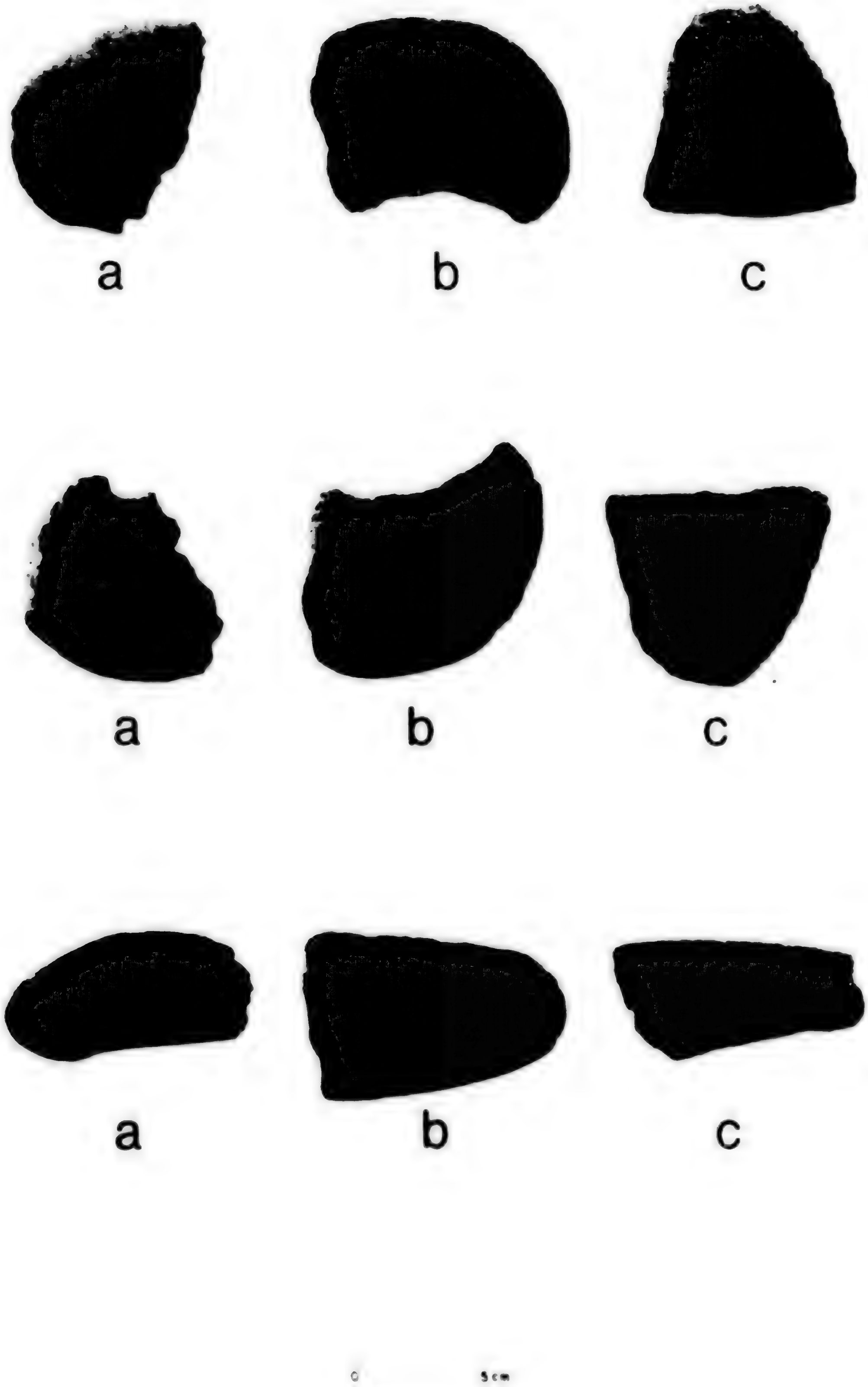


Figure 7.13. Concave-convex manos, plan views and cross section. a, LA 49377, SN 077; b, LA 49344A, SN 412; c, isolated artifact, 27S/46W, SN 0385.

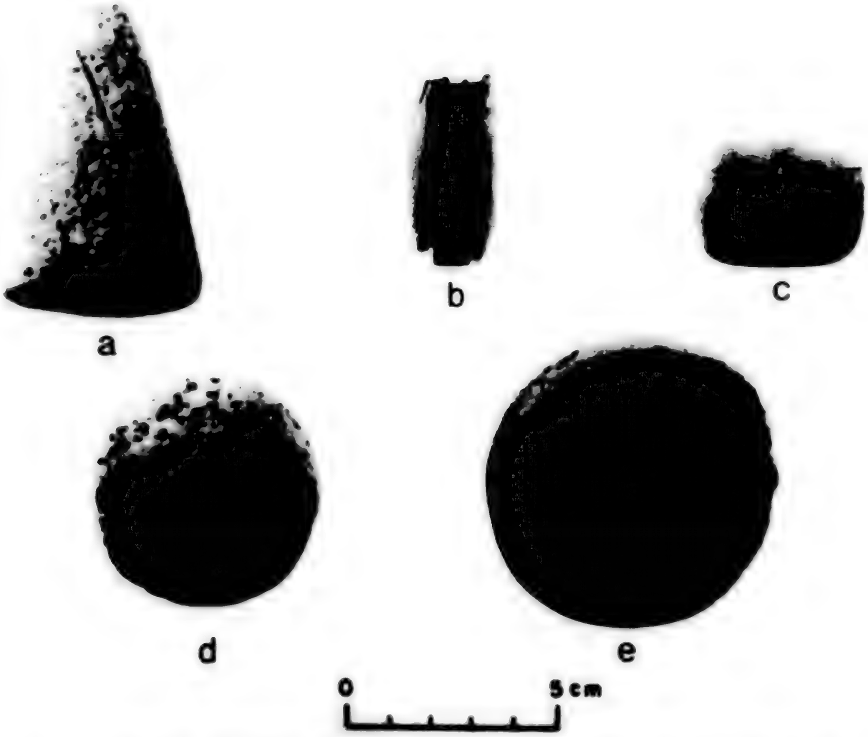


Figure 7.14. Other ground stone artifacts. *a*, small pestle, isolated artifact, 07S/12W, SN 138; *b*, exterior of pipe bowl, LA 49348, SN 276; *c*, gaming piece; *e*, abrader, isolated artifact, 04S/26W, SN 0269.

Code 0055) are nuclei of raw material that exhibit one or two flake scars, which were subsequently discarded after being tested for imperfections such as incipient planes, crystal vugs, and poorly silicified areas. Bifacial cores (Code 0065) are nuclei of raw material that exhibit flake scars oriented bidirectionally (to each face) from a shared edge. Two examples of this core form are shown in Figure 7.15. Other cores with cortex (Code 0081) are those nuclei of raw material that exhibit three or more negative flake scars. These flake scars may be oriented in a variety of ways: unidirectional, bidirectional from opposite platforms, and so forth. Tabular cores (0175) are slablike in form and have several negative scars as a result of flakes being removed from one or more faces or edges. All of these core forms have cortex on one or more of their surfaces.

0082. *Cores without Cortex*. In the Santa Teresa assemblage, this core class is composed of two subclasses: bifacial cores without cortex (Code 0067) and other cores without cortex (Code 0082). These core forms are characterized by similar elements as those classes

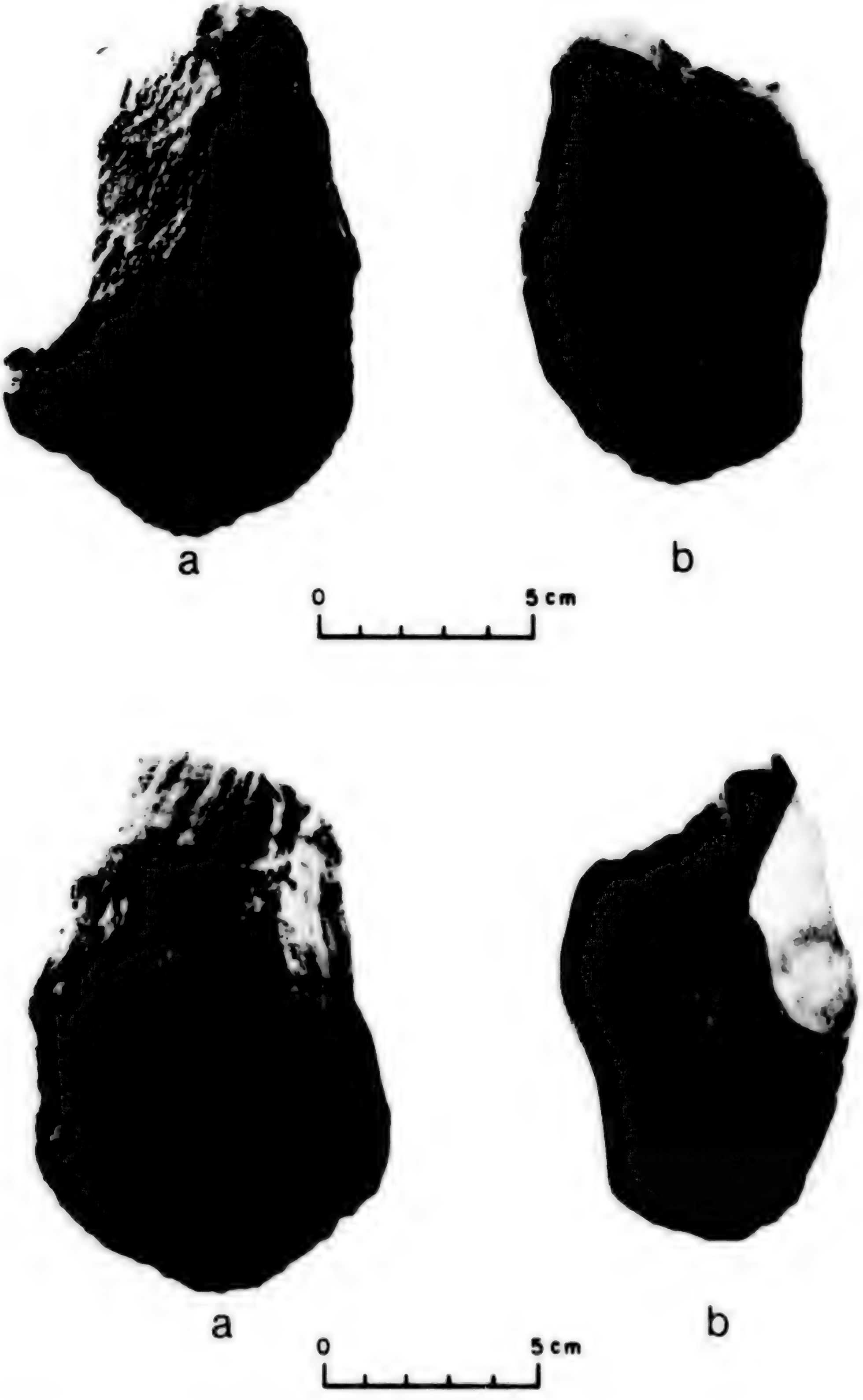


Figure 7.15. Bifacial cores, obverse and reverse views. a, IM 1, 50S/00W, SN 035; b. LA 49344A, SN 412.

defined above except that they lack cortex on any of their surfaces. Several examples of cores recovered during the Santa Teresa survey are illustrated in Figure 7.16.

Flakes

The production of stone tools is a reductive process; for example, material is systematically removed from an objective piece to produce the desired form and edge configuration of a tool. The reduction of an objective piece, whether ground or flaked stone, produces considerable amounts of waste material. The utilization and refurbishing of ground stone and flaked stone artifacts also produces waste material from surface and edge attrition. Collectively, this waste material is termed debitage. Over time many archaeologists have subdivided this debitage material into various classes to facilitate its analysis (for example, Crabtree 1972; Irwin-Williams and Shelley 1980; McDonald 1980; Moore 1982, 1983; and so forth). Most researchers agree that those pieces of debitage with cortex on their dorsal faces have been detached from an objective piece relatively early in the flaking process, while those pieces that lack cortex on the dorsal face occur later in the production sequence (for example, Crabtree 1972). Other researchers have noted that in the production of certain classes of formal tools the flake size decreases as one progresses along the reduction continuum (for example, Newcomer 1971).

In the course of the analysis of the lithic material from the Santa Teresa Project, the debitage category was subdivided into several

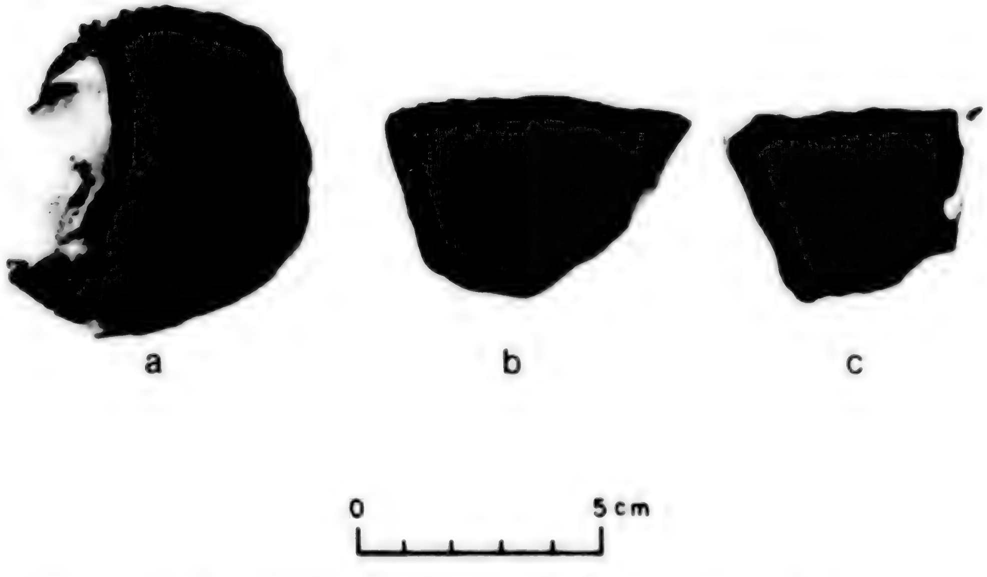


Figure 7.16. Multidirectional and unidirectional cores. a, multidirectional form; b and c, unidirectional forms.

classes. Because of their technological implications, the majority of these classes have been maintained in the presentation of the data in Table 7.4. The basic divisions of this class are based upon whether or not the artifact is a recognizable flake or flake fragment with one or more positive flake features evident (for example, a bulb of force, undulations, hackles, marginal fissures, and so forth) or a piece of angular debris (Schutt 1979) that lacks positive flake features but which is assumed to have resulted from unsuccessful attempts at reduction of an objective piece. The characteristics that are used to define the flake type classes are the maximum size of the flake in any dimension and the amount of cortex present on the dorsal face. When flakes were found that did not fully conform to the definitions, the amount of cortex present on the dorsal face was given precedence over size to allow the item to be classified.

0112. Flake Type 1. This class is comprised of flakes greater than or equal to 5 cm in size that have 25 to 100 percent cortex on their dorsal faces. Flakes smaller than 5 cm were also placed in this category if they exhibited considerable amounts of cortex on their dorsal faces.

0113. Flake Type 2. Flakes in this category are greater than 2.5 cm in size but less than 5 cm in size, and have less than 25 percent or no cortex on their dorsal face. Flakes that were greater or less than the size range given but had less than 25 percent cortex on their dorsal faces were also placed in this debitage class.

0114. Flake Type 3. Flakes that are less than 2.5 cm along their maximum dimension and have no cortex on their dorsal faces were placed in this debitage class.

0124. Limited Information Lithic Fragments with Cortex. These are fragments of lithic material that are believed to be the by-products of some stage in the lithic reductive system and are sometimes referred to as shatter or angular debris (Schutt 1979). These artifacts do not possess recognizable ventral surface fracture features and, hence, cannot be oriented as to their striking axis.

0125. Limited Information Lithic Fragment without Cortex. These artifacts conform to the above definition but lack cortex on any surface.

0127. Limited Attribute Flake Fragment with Cortex. The artifacts placed in this category are fragments of flakes. They have recognizable ventral surface fracture features that may or may not allow the flake to be oriented as to its striking axis. In general, the artifacts placed in this category are flakes that are too fragmentary to allow their placement with confidence into a specific flake type.

0128. Limited Attribute Flake Fragment without Cortex. These artifacts conform to the above definition but lack cortex on their dorsal surfaces.

0129. Unknown or Other Flake Type. This artifact class is composed of five subclasses of flakes. Because of their low frequencies of occurrence in the Santa Teresa assemblages, these subclasses have been grouped together to aid in presentation of the data in Table 7.4. The subclasses that make up this grouped class are: blades, biface thinning flakes, core rejuvenation flakes with cortex, and without cortex, and flake type unknown. Blades (Code 0115) are specialized flakes with parallel to subparallel lateral margins whose length is equal to or greater than twice the width. On the dorsal face at least one guide ridge is present, although there are occasionally two or more. These flakes are frequently associated with a prepared core technique (Crabtree 1972: 42-43). Biface thinning flakes (Code 0118) are by-products generated during the manufacture of bifacial implements such as projectile points. On the dorsal surface of the flake there should be present a number of flat flake scars from the removal of previous thinning flakes, and a dorsal guide ridge formed by these scars. One or more of the scars on the dorsal face should have a striking axis oriented between 90 and 180 degrees in relation to the striking axis of the flake being examined. In transverse cross section, the lateral margins feather out rather than form a steep angle. When viewed in longitudinal cross section, the ventral surface is often concave. The platform remnant surface will generally exhibit one or more facets (flake removals) as the result of having been removed from the edge of a bifacial implement. Sometimes the platform remnant has collapsed, resulting in the presence of a steplike fracture on the ventral face of the flake below the area of force application. Platform remnant angles tend to be acute and become more acute as one proceeds through the reductive system. Core rejuvenation flakes with cortex (Code 0119) and without cortex (Code 0120) are those pieces of debitage that represent an attempt by the artisan to create a new platform surface on a core to which force will be directed during subsequent flake detachment. These flakes generally exhibit all or a portion of the original platform on the dorsal surface, a part of the intersection of the platform, and the free face of the core on its platform remnant. As a part of the recording procedure, flake type was recorded for all flaked stone implements. The subclass flake type unknown (Code 0129) was entered when a flake had been modified to such a degree in the production of a formal tool that the flake type of the original blank could not be determined with confidence.

1000. Composite Tools. Cores and other tools are sometimes utilized and reutilized as chopping, pounding, abrading, or scraping tools. Sometimes these tools end the use cycle as cooking stones or elements in hearth features. In the Santa Teresa collection, cores that possessed angles of less than 50 degrees formed by the platform-free face juncture or the juncture of two or more flake scars were often used as chopping tools as evidenced by the use-related damage in these areas. Such damage consists of random flake detachments ending in steps and hinges, a frosted appearance along the edge caused by battering, ring cracks, and numerous nicks and cuts. Cores were also used as pounders. Elements of cores used for pounding usually take the form of an end or an edge whose angle exceeds 50 degrees. Use-related damage along this element usually occur as pitting and frosting, numerous ring cracks, occasional random flake removals that terminate in step and hinge fractures, and less extensive nicking and cutting than observed on chopping edges. A few cores show evidence of having been used as scrapers. Such cores in the Santa Teresa collections possess a single, relatively flat facet that originally functioned as a platform surface. The juncture of this surface with the free face of the core forms an obtuse angle suitable for scraping functions. This juncture is generally rounded with striations that originate at the edge and come back onto the platform surface. On the face of the core below the juncture with the platform there are a patterned series of flake scars that exhibit rounding, polishing and striations on the projections. These composite core-scraping tools have been referred to as "scraper planes" (Rogers 1929). Jackson (1977) notes that many archaeologists have frequently misclassified cores with rubbed down platform-free face junctures (a core preparation technique) as scraper planes. However, those artifacts in the Santa Teresa composite core tool-scraper category possess use-related damage that cannot be attributed to simple preparation of the core. Several composite core tools are shown in Figure 7.11a-c, e.

The majority of the composite tools in the Santa Teresa assemblages show use as cores at some point in their use life. However, ground stone artifacts were also recycled into other forms. The reuse of metate fragments as manos has already been noted. In addition, fragments of manos and metates were sometimes recycled as pounding implements. These artifacts have been included in the composite tool category. Ground stone implements (most commonly manos) were also frequently recycled as hearth elements or cooking stones. These artifacts have not been included in the composite tool category, but were recorded under their primary implement category with the notation that they were heat altered.

Morphofunctional Tools

In Table 7.5 formal, morphofunctional tools present on a site have been presented separately from the other lithic artifact classes. As noted previously, the flake type for each of these tools was encoded as the primary implement category during the recording procedure. Each tool was then assigned to a secondary morphofunctional category based upon its morphology and the character and location of retouch and utilization related damage. Because the flake type category was the primary implement type recorded, inclusion of morphofunctional tools as a part of the matrices in Table 7.5 would artificially inflate the total number of artifacts recovered from a particular context; for example, morphofunctional tools would be counted twice.

There are a number of morphofunctional classes used in this analysis, most of which are familiar to Southwestern archaeologists. Several classes with low frequencies of occurrence in the Santa Teresa assemblages have been combined into an "other morphofunctional" category. All formal, morphofunctional classes are described below and a number of these tools are depicted in Figures 7.17 through 7.21.

Table 7.5

TOOLS BY SITE

LA#	0150	0155	0156	0157	0158	0161	0164	0165	0166	0167	n=
49317	--	--	--	--	--	--	--	--	--	0.1	5
49318	--	--	.04	--	--	--	--	.02	.05	.05	9
49319	--	--	--	--	--	--	--	--	--	--	0
49320	--	--	--	--	--	--	--	--	--	--	0
49321	--	--	--	--	--	--	--	--	.02	--	1
49322	--	--	--	--	--	.02	--	--	--	--	1
49323	--	--	--	--	--	--	--	--	--	.01	1
49324	--	--	--	--	--	--	--	--	--	--	0
49325	--	.03	--	--	--	--	--	--	--	--	1
49326	--	--	--	--	--	--	.05	--	--	--	1
49327	--	--	--	.03	--	.03	--	.01	.01	--	6
49328	--	.02	.02	--	--	--	.02	--	--	--	3
49329	--	--	--	--	--	--	--	--	--	--	0
49330	--	.02	.02	--	--	--	--	.02	--	--	3
49331	--	--	--	--	--	--	--	--	--	--	0
49332	--	--	.08	--	--	--	--	--	--	--	1
49333	--	--	--	--	--	--	--	--	--	--	0
49334	--	--	--	--	--	--	--	--	--	--	0
49335	--	--	--	--	--	--	--	--	--	--	0
49336	.006	.006	.01	.01	.03	.04	.04	.006	.03	--	29
49337	--	--	.06	--	--	--	--	--	--	--	2
49338	--	.02	.04	--	--	--	--	--	.02	--	4
49339	.004	.004	.04	.004	.04	.01	.004	.004	.004	.009	28
49340	--	.01	--	.01	--	.02	--	--	--	--	4

Table 7.5, continued

TOOLS BY SITE

LA#	0150	0155	0156	0157	0158	0161	0164	0165	0166	0167	n=
49341	--	--	--	--	--	.03	--	--	.03	--	2
49342	--	.02	.02	--	--	--	--	--	.02	--	3
49343	--	.01	.01	--	--	.03	--	--	.01	--	6
49344	--	--	.05	--	--	.1	--	--	--	--	13
49345	--	--	--	--	--	--	--	--	--	--	0
49346	--	.02	.01	--	--	--	.01	--	--	--	4
49347	--	--	--	.009	--	--	--	.009	.03	--	5
49348	--	--	.02	.008	--	--	.02	--	.02	--	8
49349	--	--	--	--	--	--	--	--	.01	--	1
49350	--	--	--	--	--	--	--	--	--	--	0
49351	--	--	.02	--	--	.05	--	.03	--	--	10
49352	--	--	.04	.009	--	.009	--	.04	--	--	10
49353	--	.005	--	--	--	--	.01	--	--	--	3
49354	--	--	--	--	--	--	--	--	--	--	0
49355	--	.001	.003	--	--	.006	.004	.006	--	--	14
49356	--	--	--	.02	--	.008	--	.02	.04	.008	12
49357	.003	--	.009	.006	--	.04	.006	.009	.006	.01	29
49358	.002	--	.007	--	.002	.005	--	--	--	--	7
49359	--	--	.01	--	--	--	--	--	--	.01	2
49360	--	--	.1	--	--	--	--	--	--	--	4
49361	--	--	.008	--	--	.02	--	--	--	.03	7
49362	--	.02	.02	--	--	.02	--	--	--	--	3
49363	--	--	.04	--	--	--	--	.04	.04	--	3
49364	--	.004	.006	--	.006	.03	.004	.004	.008	.01	36

Table 7.5, continued

TOOLS BY SITE

LA#	0150	0155	0156	0157	0158	0161	0164	0165	0166	0167	n=
49365	--	--	--	--	--	--	--	--	--	--	0
49366	--	--	.01	--	--	.03	--	--	--	--	3
49367	--	--	.08	--	--	--	--	--	.08	--	2
49368	--	--	--	--	--	--	--	--	--	--	0
49369	--	--	--	--	--	.04	--	--	--	--	5
49370	--	--	--	--	.02	--	--	--	--	--	1
49371	--	--	--	--	--	--	--	--	--	--	0
49372	--	.02	.03	.02	--	--	--	.006	.006	--	13
49374	--	--	--	--	--	--	--	--	--	--	0
49376	--	.03	.03	.02	--	--	--	--	--	--	8
49377	--	--	--	--	.009	.05	.009	.009	.02	.02	12
49378	--	--	.03	--	--	--	--	--	--	--	1
49379	--	.02	.03	.02	--	--	--	--	.009	--	8
49380	--	--	--	--	--	.05	.05	--	--	--	2
49381	.005	.005	.005	--	.005	.005	.005	.005	.01	--	9
49382	--	--	.03	--	--	.02	.01	--	.02	.01	9
49383	--	--	.009	--	--	.02	--	--	.009	--	4
49384	--	.008	.008	.008	--	--	--	--	.008	--	4
49385	--	--	--	.009	--	.06	.02	--	--	--	9
49386	--	.008	.008	--	--	.008	--	--	.02	--	5

Keys for Codes to Tool Types

150	Stage Bifaces
155	End Scraper
156	Side Scraper
157	End-side Scraper
158	Flake Scraper
161	Utilized Flake
164	Other Morpho-functional Category
165	Biface Form Indeterminate
166	Scraper Form Indeterminate
167	Flake w/grinding or pecking on Dorsal Face

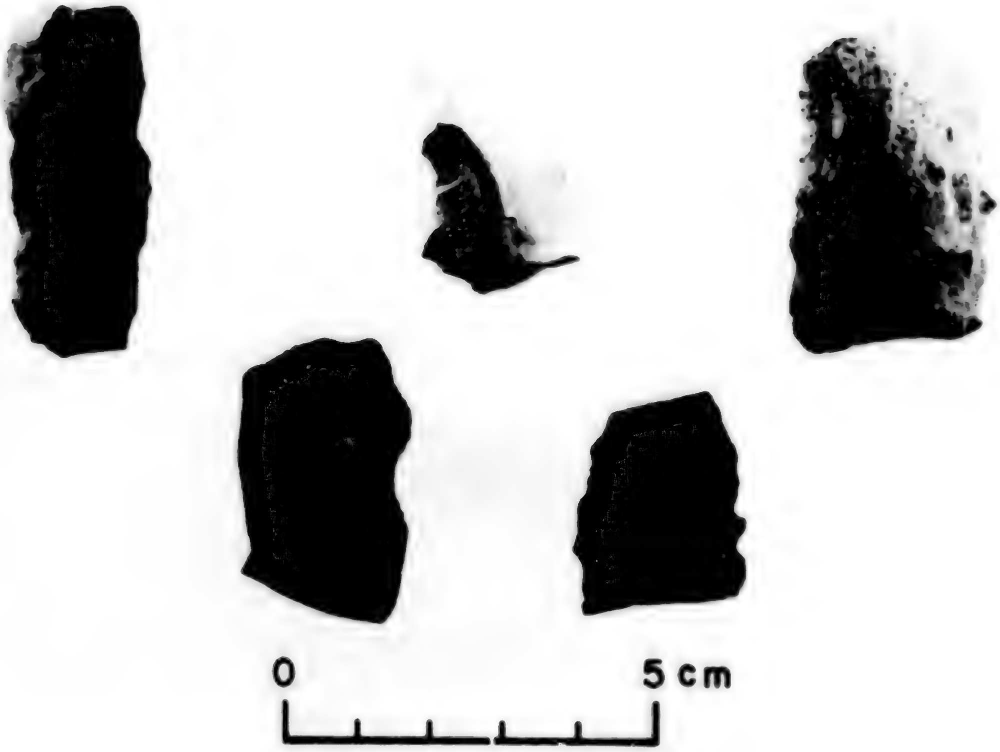


Figure 7.17. Stage bifaces.

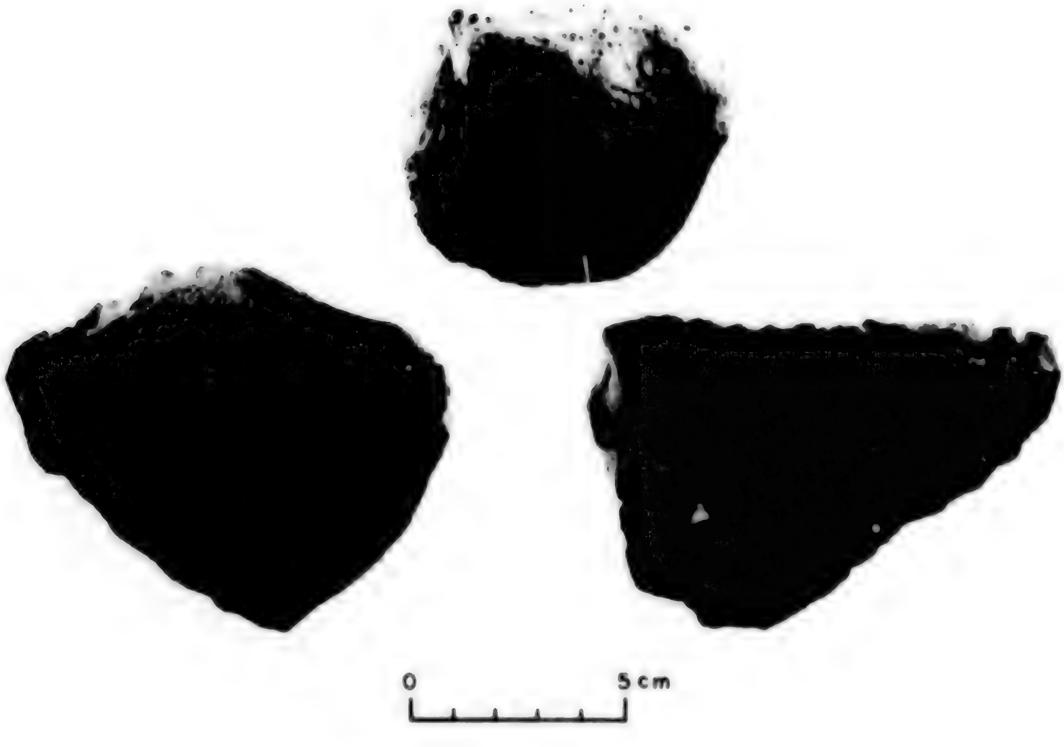


Figure 7.18. Large scrapers.

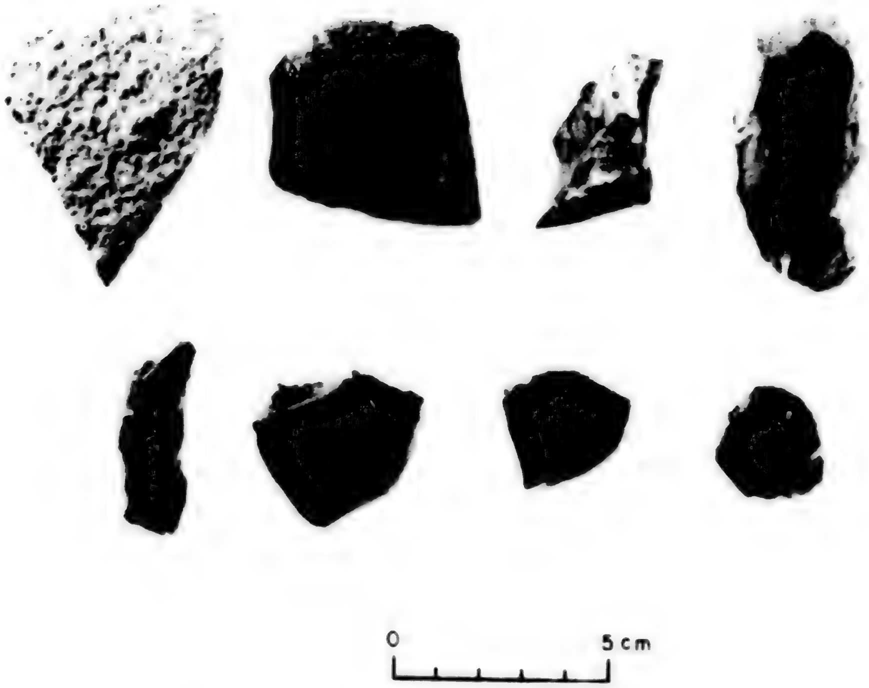


Figure 7.19. Other scraper forms.

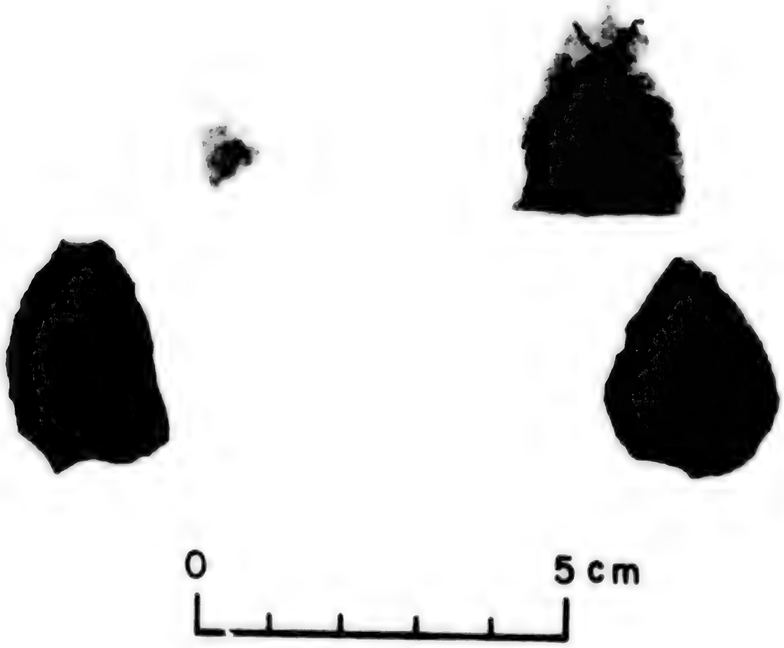


Figure 7.20. Knives.

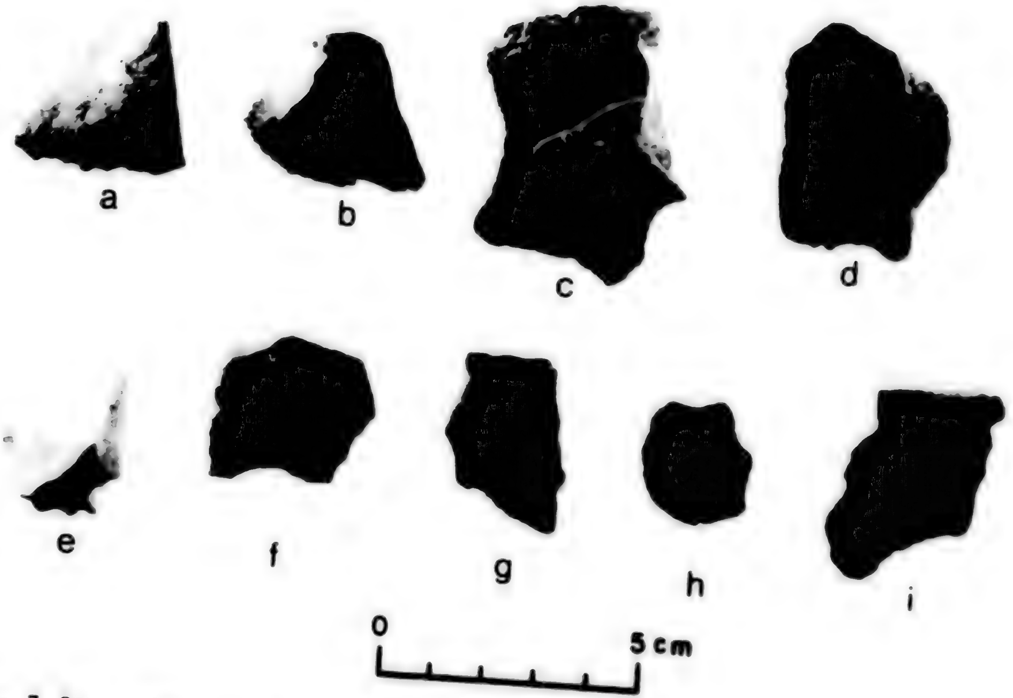


Figure 7.21. Denticulates and composite flake tools. *a* and *b*, denticulates; *c*, perforator; *d*, scraper-perforator; *e*, scraping-cutting-denticulate edge tool; *f*, scraper-spokeshave-cutting edge tool; *g* and *h*, scraper-spokeshaves; *i*, spokeshave-perforator.

0150. *Stage Bifaces*. Artifacts were assigned to the blank (Code 0150) category by following the guidelines of Bradley (1975: 5):

> Any piece of lithic material that has been modified to an intended stage of a lithic reduction sequence in a specified assemblage. It must be demonstrable that it is not a finished implement and that it is intended for further modification . . . It must have the morphological potential to be modified into more than one implement type within the assemblage.

The criteria used in this analysis include irregularity of shape in plan view, an irregular cross section, and moderate to high sinuosity of the edges in longitudinal cross section. Few preforms (Code 0151) were recovered during the Santa Teresa survey. According to Bradley (1975: 6), preforms are similar to blanks in that they are intended stage of reduction in a specific assemblage, but have the morphological potential of being further modified into only *one* implement type within an assemblage. Preforms have more regular shapes in plan view, more regular transverse cross sections, and less sinuosity of the edges in longitudinal cross section. Most blanks and preforms in the Santa

Teresa collections (Fig. 7.17) appear to be stages in the production of projectile points or small bifacial "knives."

0155 to 0158. Scrapers. These artifacts are generally fashioned from relatively thick flakes of a wide range of sizes and have a steep edge angle suitable for scraping a variety of materials. Side scrapers (Code 0156) possess retouch along one or more lateral margins. End scrapers (Code 0155) have retouch along the termination of the flake. End-side scrapers (Code 0157) possess retouch along one or more lateral margins and the termination. Flake scrapers (Code 0158) differ from the above in that they have been fashioned from much thinner flakes, but still possess the steep marginal retouch characteristic of other scrapers. All scraper forms in the Santa Teresa collection exhibit some degree of use as exhibited by small unidirectional detachments that end in step or hinge fractures, rounding of the projections formed by production-related retouch and use-related flake detachments, and sometimes polish and striations (Figs. 7.18 and 7.19).

0161. Utilized Flakes. These are flakes that have been utilized along one or more edges, an arris, or some other surface. Because these flakes have not been modified by intentional retouch, in almost all cases they retain most of the original features of the flake blank. Although formal use-wear analyses were not performed on the Santa Teresa utilized flakes, observations of these artifacts during the course of the general analysis suggest that unmodified flakes were used for a variety of cutting and scraping tasks.

0164. Other Morphofunctional Category. In order to facilitate data presentation, a number of artifact classes have been grouped under this code. Five subclasses of artifacts make up the larger class: knives, perforator, spokeshaves, choppers, and other morphofunctional items. Knives (Code 0152) are specialized cutting implements that have been bifacially retouched along one or more margins. These artifacts have acute edge angles, generally between 25 and 35 degrees (Lawrence 1980). Only two whole knives were collected during the Santa Teresa survey. One is leaf shaped and the other is irregular. The shapes of the other two knife fragments recovered could not be determined with confidence (Fig. 7.20). Only one artifact was recovered during the Santa Teresa survey that was used solely as a perforator (Code 0154). This artifact (Fig. 7.21c) possess one projection on the margin, the apex of which exhibits considerable rounding and some polish. No microspalling or striations were noted. Spokeshaves (Code 0160) are intentionally or unintentionally retouched artifacts with one or more steep angled concavities along an edge or edges. Retouch and utilization damage is most commonly unidirectional. These artifacts are thought to be used in woodworking, specifically to shape and smooth the shafts of arrows and darts (Woodbury 1954). However, other possible uses, such as for stripping leaves and twigs from various kinds of vegetation, cannot be ruled out. Choppers (Code 0164) are heavy duty tools, unifacially or bifacially retouched to produce an edge with an angle of less then 50 degrees. All of the choppers in the Santa Teresa collection are composite core tools (see above). The last subclass in the group is a category for other flake tools and denticulates for which codes were not provided. The majority of the artifacts coded in this category are flake tools that exhibit evidence of two or more uses, such as the combined scraper-spokeshaves illustrated in Figure 7.21.

0165. Biface Form Indeterminate. Artifacts placed in this category exhibited bifacial retouch along one or more margins, but were too fragmentary to be assigned with confidence to one of the biface categories provided.

0166. Scraper Form Indeterminate. These are fragments that could not be assigned to a specific scraper category as defined above. In all cases, the fragmentary nature of the item precluded orientation of the flake blank so that the location of the retouch or utilization could be accurately determined. All of the artifacts placed in this category possess steep edge angles and the unidirectional retouch or utilization damage commonly associated with scraping.

0167. Flake with Grinding or Pecking on Dorsal Face. In retrospect, these artifacts would probably have been better classed as another form of debitage, but to do so would have sacrificed information concerning the damage on the dorsal face. These artifacts are not tools, but are "waste flakes" from the apparent refurbishing of ground stone artifacts. In all cases, the dorsal face of the flake exhibits at least one ground facet that is characterized by significant high point planning of the grains that form the rock, occasional stria, and almost always some pitting resulting from pecking of the surface prior to detachment of the flake.

0200. Projectile Points. These implements are generally thought to have been designed for piercing, having been hafted in some fashion on the end of a spear, dart or arrow. However, other potential uses (for example, cutting, scraping, and so forth) cannot be ruled out without subjecting such artifacts to use-wear analysis (for example, Odell 1981). Projectile points vary widely in technological and stylistic attributes. Because of their significance as potential temporal indicators, the projectile points recovered during the Santa Teresa survey will be more fully described.

Summary

Employing the implement class data from those sites that were designated as single component, three tests were made to determine whether temporally sensitive patterning existed in these collections. In the first test, the metate forms present on each of the single-component sites were examined. Lehmer (1948) described the most common metate forms associated with the Hueco phase as being slabs or oval bowls. No preferences for specific forms were given for the Mesilla and Dona Ana phase assemblages but he does note that trough forms were quite common in the El Paso phase, although basin metates were still found in low frequencies. Cosgrove (1947) supported these observations in part when he noted that shallow basins continued in use in those assemblages with El Paso polychrome associated but that the most common form of metate was the trough. O'Laughlin (1980) feels that very little is understood concerning the temporal distribution of mano and metate forms in the El Paso area. He views changes in ground stone form as varying with site function as well as time, and believes that small circular manos were perhaps earlier in time or at least occurred with greater frequency in ephemerally occupied special-activity camps. He does, however, support the general trend suggested above when he notes two-hand manos, and open-ended basins and trough metate forms as being characteristic of the late ceramic periods.

Metate forms in the Santa Teresa collection include slabs, basins, and troughs. The two single-component Archaic sites that had metate fragments in the assemblages (LA 49349 and 49358) revealed no patterning. At LA 49349 four metate fragments were recovered; one was a basin form, and the remaining three were fragments of one or more troughs. At LA 49358 one slab form was recovered in addition to one slab and two trough forms. Six Mesilla phase sites contained metate fragments. All metate forms are present in these collections. The slab form was the most frequently recorded with a total of 14 fragments, followed by a total of 9 troughs and 6 basins. Single-component El Paso phase sites also exhibited mixed metate forms in the assemblages. The assemblages from LA 49335 contained one slab form and one trough. The assemblage from LA 49341 contained two basin and two trough forms, while LA 49377 contained only one trough form. When all sites with an El Paso component that had metates present are considered, only one site, LA 49346, does not include at least one trough metate fragment. Although these data are generally supportive of trough forms on sites of earlier periods, it is likely, but not certain, that the presence of these troughs on purportedly single-component earlier sites may be indicative of a reoccupation of these localities by later ceramic peoples.

A second test for temporal sensitivity in the ground stone assemblages involved testing for significant differences in the mean frequencies of these artifacts on probable single component sites. Carmichael (1982a) has suggested that during the El Paso phase reliance on agricultural products increased with a concomitant decrease in specialized gathering activities. This decreased emphasis on specialized gathering activities might be revealed by the presence of fewer ground stone tools on small ephemerally occupied sites dating to the El Paso phase. A difference of means test was run on the mean frequencies of ground stone on single component sites designated as Archaic, Mesilla, and El Paso. The results of all these tests comparing Archaic to Mesilla ($t=0.47702$, $df=15$), Archaic to El Paso ($t=1.50878$, $df=6$), and Mesilla to El Paso ($t=1.37073$, $df=13$) were not significant at the 0.05 level or beyond.

A number of researchers have noted that formal retouched tools are found more frequently on Archaic period sites, whereas sites of the Puebloan period are characterized by the use of expedient nonretouched flake tools (Chapman 1977; Laumbach 1980; Vogler 1982; Simmons 1984; Hicks 1985). Carmichael (1982a: 154) notes that El Paso phase villages in the Tularosa Basin are "characterized by vast numbers of minimally modified flakes," a technology that he terms "expedient." It was possible to test these observations using the data from single-component

Archaic, Mesilla, and El Paso phase sites, and a comparison was made of the frequencies of retouched flake tools (excluding projectile points) versus the frequencies of utilized flakes. The obtained Chi-square value of 6.0582 was significant at the 0.05 level for two degrees of freedom. An analysis of the Chi-square table reveals that there are more flake tools on the Archaic sites than the expected value indicates, while on El Paso phase sites, there are fewer flake tools but more utilized flakes than the expected value indicates. Mesilla phase sites have observed values comparable to the expected values. It should be noted that the cell for Archaic utilized flakes has a low value (n=2), which may have affected the results. However, the results do suggest that labor investment in tool manufacture was more intense during the Archaic phase than in the later El Paso phase.

Projectile Points in the Santa Teresa Assemblages

Changes in projectile point styles have frequently been employed by archaeologists as temporal indicators. This is particularly true for surface and preceramic sites where other temporally sensitive artifacts and datable materials may be absent. Development of a local projectile point typology for the El Paso area has been hampered by a lack of excavated stratified and well dated sites. This absence of a local chronologically sensitive typology has led many researchers in the area to assign projectile points to broad temporal periods based upon comparisons to typologies that have been developed for adjacent regions (for example, O'Laughlin 1980; Carmichael 1982a; Fields and Girard 1983).

As a part of the field laboratory procedure projectile points were separated from the rest of the collection and given a preliminary type designation by Patrick Beckett and John Frizell. Where a type name existed in the literature, this name was applied. However, a large number of forms could not be assigned to an existing type. This is reflected in the use of type designations originally shown in Beckett's (1973) thesis and designation of many artifacts as "unidentified" types. Many of these projectile points probably represent variants of existing types. However, because so little is known about the stylistic variability of these artifacts in the El Paso area, a considerable effort was made not to force specific artifacts into a typological category where they might not belong.

In the following pages each projectile point will be described in considerable detail. The purpose of these descriptions is to provide other researchers information regarding the range of variation in the stylistic and metric attributes of the projectile points in this collection. These descriptions should aid future researchers in the definition of local types, the definition of subregional variation in local types, and the range of variation in local variants of existing types. Where points have been assigned to an existing type the probable temporal affiliation of the type will be discussed. The practice of assigning broad temporal affiliations to the types and individual points based upon comparison to existing typologies in adjacent regions will be followed here. The primary sources used in this study include Haury (1950), Suhm and Jelks (1962), Dick (1965), Jelinek (1967), Beckett (1973), O'Laughlin (1980), Carmichael (1982a), and Fields and Girard (1983).

Metric information for all projectile points is provided in Table 7.6. All measurements (except as noted below) were taken with a pair of dial calipers and are given in the table in centimeters. Information pertaining to cross section, overall shape, grinding, reworking, and so forth, is provided in the text. It should be noted here that it was necessary to return the obsidian projectile points to Arizona State Museum for obsidian hydration analysis before the attribute recording format could be developed. Accordingly, these projectile points were analyzed from photographs, which precluded the collection of certain classes of data such as cross section, thickness, and so forth.

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In the Santa Teresa collection, two projectile points were assigned to this type (Fig. 7.22). This type was first defined at Bat Cave by Dick (1965). All points of this type found at Bat Cave were recovered from the prepottery midden (Dick 1965: 31). The point recovered from 05S/31W Sample Number (SN) 318 (Fig. 7.22a) was fashioned from obsidian. The overall shape is a rough diamond in outline. The stem contracts slightly towards the base which is convex. The left blade margin is slightly concave and the right margin is convex. The blade is serrated and the shoulders are well-defined. The second point of this type (Fig. 7.22b) was recovered from LA 49338 (SN 310, Point 3). This projectile point was fashioned from a coarse grained basalt and has been broken not far above the shoulders, removing about two-thirds of the blade. The shoulders on this artifact are well-defined. The stem contracts toward the base, which is straight with one corner slightly elevated above the other. The cross section is lenticular. Evidence of grinding is present on the base and stem margins.

Dick (1962) found this projectile point form restricted to the prepottery levels at Bat Cave. Haury (1950) assigns points of this type to the Amargosa II-Chiricahua strata at Ventana Cave. Carmichael (1982a) illustrates two points of this type from the Tularosa Basin. The two points in the Santa Teresa collection differ from the majority of points illustrated by these authors in that the shoulders are less well defined. However, both Dick (1962: 28, Fig. 22q, r) and Haury (1950: 281, Fig. 59k) illustrate forms of this projectile point type that have shoulder forms similar to the two points described here. O'Laughlin (1980: 196, Fig. 37g) illustrates one point that resembles this type to which he assigns an Archaic affiliation. Carmichael (1982a: 72) assigns points of this type to the Middle Archaic period in the El Paso area. Because this is the best source available on local projectile point forms, Carmichael's (1982a) temporal designations are used here.

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Table 7.6

METRIC DATA FOR PROJECTILE POINTS FROM THE SANTA TERESA SURVEY

Provenience											
Transect No.	LA Number	Sample Number	Type	Length	Max. Width	Max. Thick.	Stem Width	Blade Length	Basal Stem Length	Basal Width	Material
05S/31W		SN 318	Augustin	2.9	1.8	--	1.4	1.8	1.1	0.9	Obsidian
12S/30W	LA 49338	SN 310	Augustin	--	1.7	0.5	1.6	--	1.6	0.7	Coarse Grained Basalt
31S/01W		SN 051	Chiricahua	4.4	2.0	0.5	1.6	3.5	0.9	2.0	Chert
02S/29W	LA 49349	SN 301	Chiricahua	3.8	2.1	0.5	1.6	2.9	0.9	1.8	Chert
12S/24W		SN 255	Chiricahua	--	--	0.6	1.2	--	1.0	--	Chert
10S/28W	LA 49343	SN 295	Chiricahua	2.8	1.9	0.5	1.4	2.1	0.7	--	Chert
11S/19W	LA 49337	SN 440	Chiricahua	2.5	2.0	0.5	1.2	1.4	1.1	1.9	Chalcedony
52S/00W	LA 49314	SN 005	Chiricahua	--	1.6	--	--	--	--	1.6	Obsidian
40S/00W		SN 025	Chiricahua	--	1.9	--	1.5	--	1.0	1.9	Chert
14S/29W	LA 49358	SN 303	Pelona	3.0	1.3	--	1.1	2.2	0.8	0.7	Obsidian
56S/00W		SN 042	Pelona	2.7	1.3	--	1.2	1.4	1.3	0.4	Obsidian
12S/27W	LA 49357	SN 283	Pelona	3.0	1.4	--	1.1	2.2	0.8	--	Obsidian
12S/23W	IM #1	SN 228	Pelona	--	1.3	0.5	--	--	--	0.9	Fine grained rhyolite
05S/31W		SN 318	Pelona	2.7	1.7	--	1.6	1.3	1.4	1.0	Obsidian
20S/40W	LA 49328	SN 366	Pelona	2.7	1.4	--	--	1.6	--	1.1	Obsidian
37S/00W		SN 022	Pelona	3.8	2.1	0.7	1.3	2.7	1.1	1.0	Chert
29S/02W	LA 49354	SN 125	Shumla	--	--	0.5	1.2	--	0.9	1.4	Chert
57S/08W		SN 125	Shumla	--	3.2	0.6	1.3	--	1.0	1.7	Chert
42S/02W		SN 053	Shumla	--	--	--	--	--	--	--	Chert
32S/10W			San Pedro	5.4	1.8	0.7	1.2	4.5	0.9	1.5	Chert
32S/06W		SN 076	San Pedro	--	1.7	0.7	0.8	--	--	--	Chert
14S/28-29W	LA 49359	SN 298/303	San Pedro	--	1.7	0.6	0.9	--	--	--	Chert
10S/28W	LA 49343	SN 295	San Pedro	--	1.4	0.7	0.9	--	0.9	1.2	Chert
20S/47W		SN 391	San Pedro	3.5	1.8	0.6	1.3	2.7	0.8	1.8	Chert

Table 7.6, continued

METRIC DATA FOR PROJECTILE POINTS FROM THE SANTA TERESA SURVEY

Provenience											
Transect No.	LA Number	Sample Number	Type	Length	Max. Width	Max. Thick.	Stem Width	Blade Length	Basal Stem Length	Basal Width	Material
37S/05W	LA 49364	SN 070	San Pedro	--	1.7	0.4	1.4	--	0.5	1.7	Chert
37S/05W	LA 49364	SN 070	San Pedro	3.8	1.9	0.4	1.2	3.2	0.6	1.3	Chert
32S/13W	LA 49372	SN 140	San Pedro	--	1.5	0.6	1.0	--	0.8	1.3	Chert
08S/17W		SN 180	San Pedro	--	--	0.7	0.9	--	1.1	1.3	Chert
36S/08W		SN 106	Beckett 6	3.6	1.6	0.7	1.2	2.4	1.2	1.0	Rhyolite
02S/07W	LA 49340	SN 217	Beckett 6	--	--	0.8	1.3	--	1.1	1.0	Chert
57S/24W		SN 258	Pueblo side-notched	2.7	1.5	0.4	0.7	1.8	0.9	1.3	Chert
45S/31W		SN 344	Pueblo side-notched	2.2	1.4	0.2	0.8	1.7	0.5	1.4	Chert
39S/00W		SN 024	Maljamar	4.3	1.8	0.5	1.3	2.4	1.9	0.9	Chert
16S/02W	LA 49352	SN 046	Maljamar	--	--	--	--	--	--	--	Obsidian
35S/19W		SN 197	Beckett 9	4.3	--	0.5	0.8	3.6	0.7	--	Chert
32S/07W		SN 086	Beckett 9	4.0	2.1	0.6	0.9	3.1	0.9	1.3	Chert
22S/00W		SN 096	Beckett 9	4.4	2.3	0.5	1.0	3.6	0.8	--	Chalcedony
31S/14W	LA 49385	SN 432	Beckett 9	3.7	2.0	0.6	1.2	3.0	0.7	1.3	Chert
12S/30W	LA 49338	SN 310	Beckett 9	3.4	--	0.5	1.1	2.4	1.0	1.2	Chert
03S/28W	LA 49347	SN 290	Beckett 9	--	2.3	0.5	1.1	--	1.1	1.5	Chert
36S/10W	LA 49382	SN 132	Beckett 10	--	--	--	0.9	--	0.8	--	Obsidian
08S/20W		SN 411	Beckett 10	2.6	2.0	--	1.0	1.9	0.7	1.2	Obsidian
29S/02W	LA 49354	SN 050	Beckett 10	--	--	0.4	0.8	--	0.9	0.6	Chert
07S/28W		SN 292	Beckett 10	3.4	--	0.5	1.0	2.4	1.0	0.9	Chert
35S/08W	LA 49381	SN 105	Beckett 10	--	--	0.5	0.9	--	0.8	0.9	Welded Tuff
14S/28-29W	LA 49358	SN 298/303	Beckett 10	--	2.2	0.6	1.1	--	0.9	0.8	Chert
04S/20W		SN 200	Beckett 10	3.9	1.6	0.5	0.8	3.0	0.9	1.3	Chert

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Table 7.6, continued

METRIC DATA FOR PROJECTILE POINTS FROM THE SANTA TERESA SURVEY

Provenience											
Transect No.	LA Number	Sample Number	Type	Length	Max. Width	Max. Thick.	Stem Width	Blade Length	Basal Stem Length	Basal Width	Material
08S/25W		SN 254	Beckett 10	--	1.8	0.5	1.0	--	0.8	1.0	Chert
12S/26W	LA 49357	SN 271	Beckett 10	--	1.4	--	0.7	--	0.6	1.1	Obsidian
05S/31W		SN 318	Oshara	--	--	--	--	--	--	1.5	Fine Grained Basalt
07S/19W		SN 196	Oshara	--	--	--	--	--	--	1.6	Obsidian
12S/30W	LA 49338	SN 310	Oshara	--	--	--	1.4	--	1.1	1.4	Chert
04S/27W	LA 49353	SN 279	Folsom	--	--	--	--	--	--	--	Chert
38S/09W	LA 49379	SN 127	Beckett 5	--	--	--	1.0	--	0.4	1.1	Obsidian
03S/31W		SN 316	Unnamed A	2.5	2.0	--	--	--	--	1.7	Obsidian
10S/28W	LA 49343	SN 295	Beckett 7	--	2.6	0.7	1.4	--	0.8	1.6	Chert
29S/02W	LA 49354	SN 050	Small Corner-notched	1.5	--	--	0.8	.09	0.6	--	Obsidian
04S/30W		SN 308	*Unid 1	2.5	1.8	0.5	1.1	1.8	0.7	1.1	Chert
04S/30W	LA 49339	SN 308	*Unid 1	3.6	1.8	0.7	1.1	3.0	0.6	1.1	Chalcedony
14S/28-29W	LA 49358	SN 298/303	*Unid 1	3.3	2.9	--	1.3	2.1	1.2	1.3	Obsidian
23S/38W	LA 49327	SN 358	*Unid 1	3.5	2.0	--	1.1	2.8	0.7	1.3	Obsidian
10S/28W	LA 49343	SN 295	*Unid 1	3.9	2.1	0.6	1.0	3.2	0.7	0.9	Fine Grained Basalt
51S/07W		SN 089	*Unid 2	2.7	1.5	--	--	--	--	0.9	Obsidian
22S/07W		SN 085	*Unid 2	2.3	1.6	0.5	--	--	--	1.1	Fossil Bone
00S/20W		SN 198	*Unid 2	--	--	--	--	--	--	1.4	Obsidian
26S/17W		SN 182	*Unid 2	4.0	1.9	0.5	--	--	--	1.5	Petrified Wood
14S/28-29W	LA 49358	SN 298/303	*Unid 2	3.6	1.6	0.7	--	--	--	1.3	Chert
35W/15W		SN 150	*Unid 3	--	2.7	0.8	1.4	--	0.9	1.5	Chert
26S/45W		SN 372	*Unid 3	--	--	--	1.2	--	0.9	1.5	Chert
08S/31W		SN 321	*Unid 3	--	1.9	1.0	1.0	--	1.0	0.9	Fine Grained Igneous Other
33S/00W		SN 018	*Unid 3	4.9	1.5	0.6	1.1	3.6	1.3	0.8	Chert

Table 7.6, continued

METRIC DATA FOR PROJECTILE POINTS FROM THE SANTA TERESA SURVEY

Provenience Transect No.	LA Number	Sample Number	Type	Length	Max. Width	Max. Thick.	Stem Width	Blade Length	Basal Stem Length	Basal Width	Material
28S/02W	LA 49354	SN 049	*Unid 3	--	--	--	1.5	--	1.0	1.4	Obsidian
54S/06W		SN 081	*Unid 4	4.2	1.5	0.7	1.2	3.1	1.1	1.1	Fine Grained Rhyolite
16S/26W		SN 273	*Unid 4	4.2	1.9	0.9	1.3	2.2	2.0	0.9	Fine Grained Rhyolite
33S/14W		SN 145	**Unph-id	2.9	1.4	0.6	0.8	1.6	1.3	1.1	Obsidian
51S/01W		SN 431	**Unph-id	2.5	1.7	0.5	1.2	2.1	0.4	1.6	Obsidian
37S/13W		SN 142	**Unph-id	--	2.7	0.5	1.3	--	--	--	Chert
36S/14W		SN 147	**Unph-id	3.4	2.0	0.2	0.4	2.7	0.7	0.6	Rhyolite
52S/08W		SN 120	**Unph-id	--	--	--	--	--	--	0.6	Fine Grained Rhyolite
04S/30W	LA 49339	SN 146	**Unph-id	--	--	--	--	--	--	1.2	Obsidian

*Unid = Unidentified Projectile Point Type 1-4
**Unph-id = Unidentified-unphotographed Projectile Point

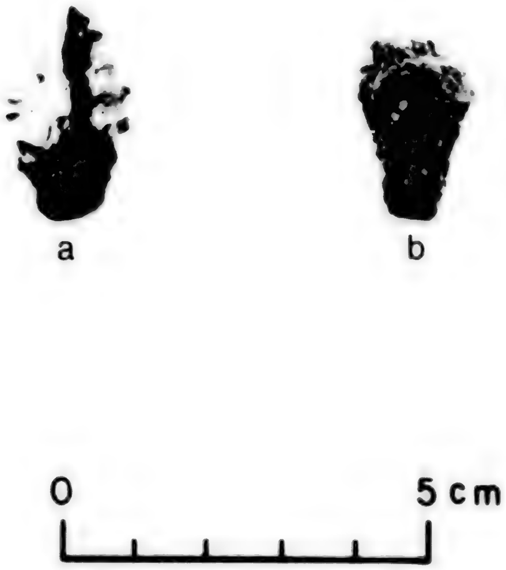

Figure 7.22. Augustin.

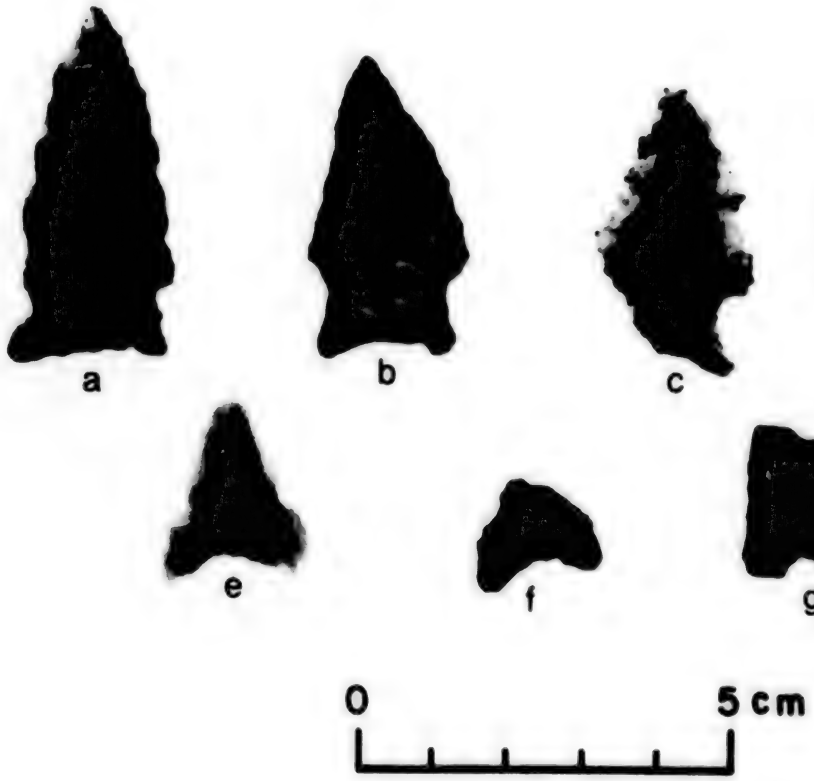

Figure 7.23. Chiricahua.

Chiricahua

Seven projectile points of this type were recovered during the Santa Teresa survey and are illustrated in Figure 7.23. The first (Fig. 7.23a) was collected from 31S/0W (SN 051) and is fashioned from a gray chert. The overall shape of this projectile point is an elongated triangle in outline with shallow notches. Both blade margins are slightly convex. The cross section is lenticular. The stem expands toward the base, which is an irregular concave shape with one ear elevated above the other.

The second point of this type was recovered from LA 49349 (02S/29W, SN 301; Fig. 7.23b) and is fashioned from one of the Franklin Mountain cherts. The overall shape is that of an elongated triangle with well-defined notches. Both blade margins are somewhat irregular, the left margin being convex-concave, while the right margin is slightly concave-convex. The stem expands toward the base which is concave with well-defined ears. The cross section is lenticular at the proximal end of the artifact and rhomboidal at the distal end. This change in cross section is due to the fact that considerable flake blank morphology still remains on both faces of the piece.

Another Chiricahua projectile point was recovered from 12S/24W (SN 255; Fig. 7.23c). The artifact has been broken at the tip, and one ear of the base is also missing. It has been fashioned from a white chert with minor gray chalcedonic inclusions. The overall shape is that of an elongated triangle with well-defined notches. The left margin of the blade is roughly straight in form, whereas the right is slightly convex. Both margins exhibit well-defined serrations. The stem contracts toward the base, which is deeply concave with the one ear remaining being well defined. The cross section is lenticular in form. This projectile point has been exposed to considerable heat as evidenced by crazing, and has a large pot-lid fracture on one face.

The fourth Chiricahua point recovered was collected from LA 49343 (10S/38W, SN 295, Point 1; Fig. 7.23d). This point was fashioned from an orangish-red chert (possibly "Laguna Agate") and is missing one ear of the base. The overall form is that of a slightly rounded triangle. The stem is slightly expanding toward the base which appears to have been deeply concave. The shapes of the blade margins are convex and both margins have slight serrations. The cross section is lenticular at the distal end and irregular at the proximal end of the piece.

Another Chiricahua projectile point was recovered from LA 49337 (11S/19W, SN 440; Fig. 7.23e). The artifact was fashioned from chalcedony and exhibits significant reworking of the blade. The reworked form is that of a slightly expanded triangle with shallow side notches. The stem expands toward the base, which is deeply concave with well-defined ears. The left margin of the blade is slightly convex; the right margin is straight with some irregularities evident. The cross section is lenticular at the proximal end and rhomboidal at the distal end.

The sixth Chiricahua projectile point was collected from LA 49317 (SN 005; Fig. 7.23f). This point was fashioned from obsidian and is missing the blade and a portion of the neck. The stem is slightly expanding and the base is deeply concave with one ear considerably shorter than the other. This projectile point somewhat resembles the chalcedony one described above and may have been reworked, but firm evidence for this is lacking owing to the missing blade.

The last projectile point of the Chiricahua type was recovered from Isolated Manifestation 1 in Unit 40S/0W (SN 025; Fig. 7.23g). It was made from a chert that resembles those described for the Franklin Mountains. This point has been broken just above the shoulders. The side notches are well defined. The base is straight but slightly irregular and differs from published type descriptions in this respect. The cross section is lenticular near the base but changes to rhomboidal on the blade.

The Chiricahua projectile point type was defined as an intrusive type into the Chiricahua phase of the Cochise Culture by Sayles and Antevs (1941). At Ventana Cave, Haury (1950) assigned points of this type to his Chiricahua-Amargosa II stage. At Bat Cave, Dick (1965) recovered projectile points of this type from prepottery strata. Projectile points of this type are assigned by Carmichael (1982a) to the Middle Archaic period in the El Paso area. This temporal designation is accepted here.

Pelona

Seven projectile points of this type were recovered during the Santa Teresa survey. Obverse and reverse views of these projectile points are shown in Figure 7.24. The first of these projectile points was collected from LA 49358 (Point 6, SN 303; Fig. 7.24a). This point was manufactured from a light gray obsidian. The overall shape is lenticular. There is a very slight shoulder and the stem contracts gently toward the base, which is convex with one corner elevated above the other. In the obverse view it will be noted that considerable cobble cortex is present.

Another projectile point of the Pelona type was recovered from Unit 56S/0W (SN 042; Fig. 7.24b). This was also fashioned from obsidian. The overall shape is lenticular like the first. There is a slight hint of a shoulder, and the stem contracts toward the base, which is convex in form with one corner elevated above the other. Both blade margins have been serrated.

The third point of this type recovered during the Santa Teresa survey was collected from LA 49357 (12S/27W, SN 283; Fig. 7.24c). This projectile point is of obsidian and approximates a leaf shape, missing a of portion the base. There is very little indication of a shoulder, which is defined principally by the presence of two serrations, one on each side of the blade. Because of the breakage at the base, stem form and basal shape are difficult to discern. The stem may have been

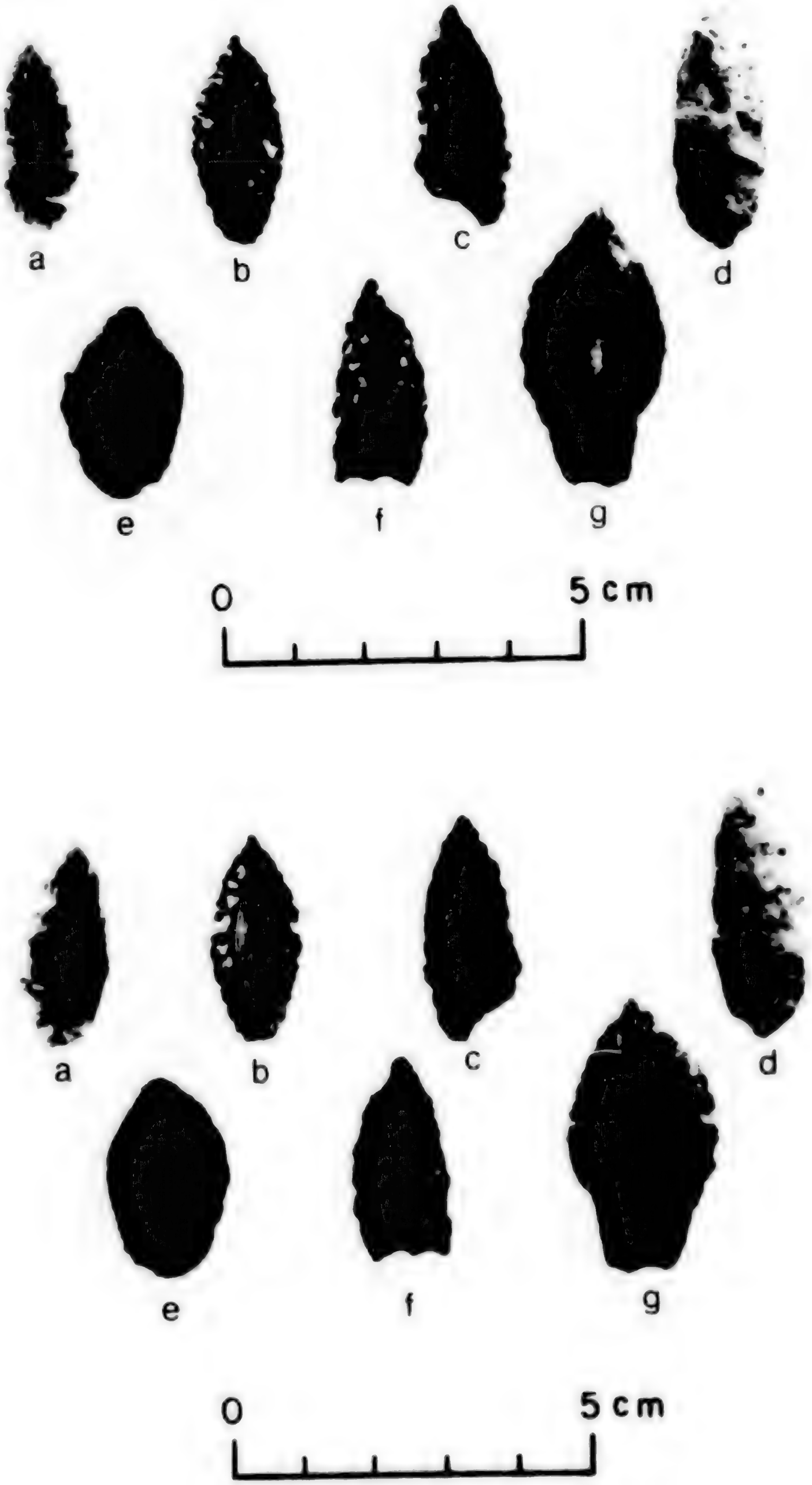

Figure 7.24. Pelona.

slightly expanding and the base was probably convex. One margin of the blade is irregular in form whereas the other is convex.

The fourth point of this type was recovered from Isolated Manifestation 1 in Unit 12S/23W (SN 228; Fig. 7.24d). This fine-grained rhyolite projectile point is missing its tip. The overall form is lenticular with no indication of a shoulder. The base is almost pointed and the cross section is rhomboidal.

The fifth projectile point of this type was collected as an isolated artifact from Unit 05S/31W (SN 318; Fig. 7.24e). This obsidian projectile point has an overall elliptical shape with well-defined shoulders, and a stem that contracts towards the base. The base itself is strongly convex. The blade portion of the point is short relative to the stem and possesses one margin that is convex and another margin that is straight.

Collection at LA 49328 (20S/40W) produced yet another projectile point of this type (SN 366; Fig. 7.24f). This point was fashioned from obsidian and is roughly leaf shaped without shoulders. One margin of the blade is straight and the other margin is concave-convex, contracting toward the base. The base is concave with some irregularity apparent. It should be noted that the assignment of this projectile point to this type is tentative. The original flake blank appears to have been quite small which probably resulted in the artisan having some difficulty controlling the flaking process. At least two large, rather deep flake scars on each face thin the base. Further reduction in this area to produce a convex base probably would have resulted in a thick cross section that may not have fit in the haft. This projectile point may be viewed then as being an unfinished Pelona form.

The last point of this type was collected from Unit 37S/0W (SN 022; Fig. 7.24g). This point was manufactured from a gray chert similar to those described as originating in the Franklin Mountains. This point is leaf shaped with a very acute angled tip and well-defined shoulders. The stem contracts toward the base, which is irregular in form, possibly as a result of some damage incurred while in the haft. The shape of both margins on the blade is concave-convex and the cross section is lenticular.

Although this point is not typical of the Pelona class, Dick (1965: 28; Fig. 22d) illustrates a similar point as belonging to the Pelona type. Sayles and Antevs (1941) illustrate projectile points of the Pelona type that they assign to the Chiricahua stage of the Cochise Culture. Dick (1965) found projectile points of this type restricted to the prepottery levels at Bat Cave. Haury (1950) assigned points of the Pelona type to his Ventana-Amargosa I stage at Ventana Cave. Carmichael (1982a) feels that the Pelona type is affiliated with a Middle Archaic occupation in the El Paso area. This broad temporal assignment is the best, given the presently available data.

Shumla

Two partial points and one fragment representing this projectile point type were recovered during the Santa Teresa survey. The two partial examples are shown in Figure 7.25. The first of the partial points was collected from LA 49354B (29S/02W, SN 125, Point 3; Fig. 7.25a). This projectile point was manufactured from a pinkish chert and is missing the tip and one tang. The overall form is that of a slightly elongated triangle with a slightly expanding stem. The base is irregular in form with one corner elevated above the other. The blade margins are slightly convex and end in elongated tangs that are set off from the stem and the base by deep notches. The cross section is rhomboidal.

The second partial point of this type is an isolated artifact collected from Unit 57S/08W (SN 125; Fig. 7.25b). This point was manufactured from chert and is missing the upper quarter of the blade. The stem is expanding and the base is slightly irregular. The remaining portion of both blade margins are relatively straight and end in somewhat elongated tangs, which are offset from the base and stem by deep notches. The cross section is lenticular in form. The last example of this type is a fragment representing one tang and a small part of the blade. This point was manufactured from chert and was collected as an isolated artifact in Unit 45S/02W (SN 053).

The Shumla projectile point type is well known in the west Texas area. Suhm and Jelks (1962: 247) estimate the temporal span of this type to occur from a yet unknown date to A.D. 700 or 800. Carmichael (1982a) assigns this type to Middle Archaic occupations in the El Paso

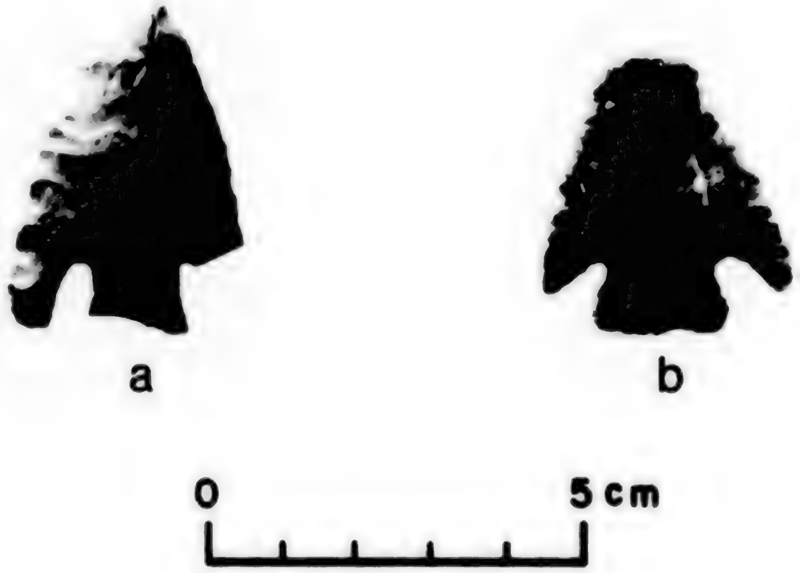

Figure 7.25. Shumla.

area. Based on this data, a Middle Archaic temporal affiliation for this projectile point type is proposed here in agreement with Carmichael (1982a).

Beckett Type 6

Two projectile points recovered from the Santa Teresa survey were assigned this type designation following Beckett (1973). The first was collected as an isolated artifact in Unit 36S/08W (SN 106; Fig. 7.26a). This projectile point was fashioned from a fine grained rhyolite. The stem expands near the base and the presence of two shallow side notches gives it a waisted appearance. The base itself appears to be slightly concave, due to an unmodified facet on the dorsal face of the flake blank. Both blade margins are convex. The point is leaf shaped in plan view and has a plano-convex cross section at the proximal end and a rhomboidal cross section at the distal end.

The second projectile point assigned to this type was collected from LA 49340B (02S/07W, SN 217; Fig. 7.26b). This point was manufactured from a very grainy chert that fits the descriptions for some cherts found in the Franklin Mountains. This point is missing the upper third of the blade. The stem is slightly expanding at the base, which is irregular-convex in form. The cross section is irregular at the proximal end and plano-convex at the break on the blade, as a result of there being little retouch of the flake blank. On the dorsal face of the flake blank, retouch is confined to the margins while the ventral face is more heavily retouched with flakes propagating across the face of the piece.

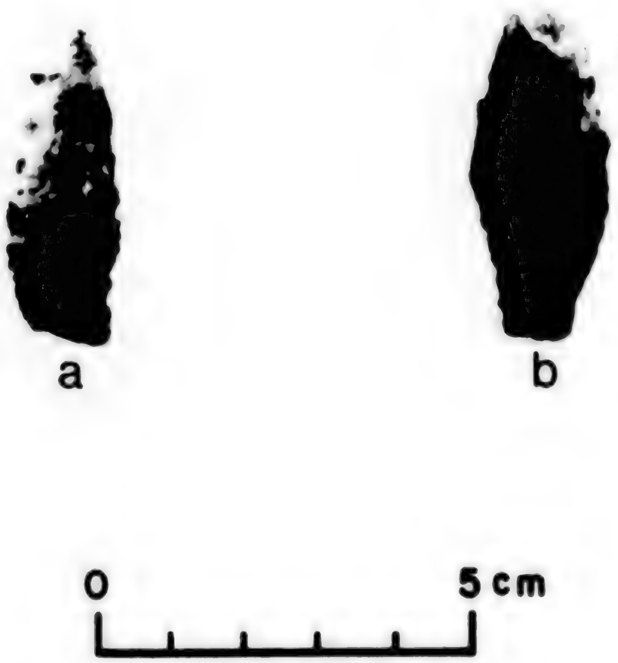

Figure 7.26. Beckett Type 6.

Sayles and Antevs (1950, Plate XVIf) illustrate one projectile point bearing some resemblance to the two points from the Santa Teresa collection, which they assign to the San Pedro stage of the Cochise Culture. Beckett (1973: 81) also recognizes a San Pedro Cochise association for this type. Carmichael (1982a: 72) feels that San Pedro Cochise materials in the El Paso area occur in the Late Archaic as well as what he terms the "Early Formative" periods. Although Dick (1965) did not recover any projectile points of this specific form, he does note that the better known San Pedro point was found in both prepottery and pottery strata at Bat Cave. Based on this information, it is here suggested that points of this type are probably associated with the Late Archaic and possibly early ceramic occupations in the El Paso area.

San Pedro

Nine projectile points assignable to this type were recovered during the course of the Santa Teresa survey. Eight of these are illustrated in Figure 7.27. One of these was recovered as an isolated artifact in Unit 32S/10W (Field Number 2273; Fig. 7.27a). This is diamond shaped in cross section. The stem expands at the base, which is strongly convex. The shapes of both blade margins are slightly convex. The shoulders are well defined by the presence of a shallow side notch on each margin.

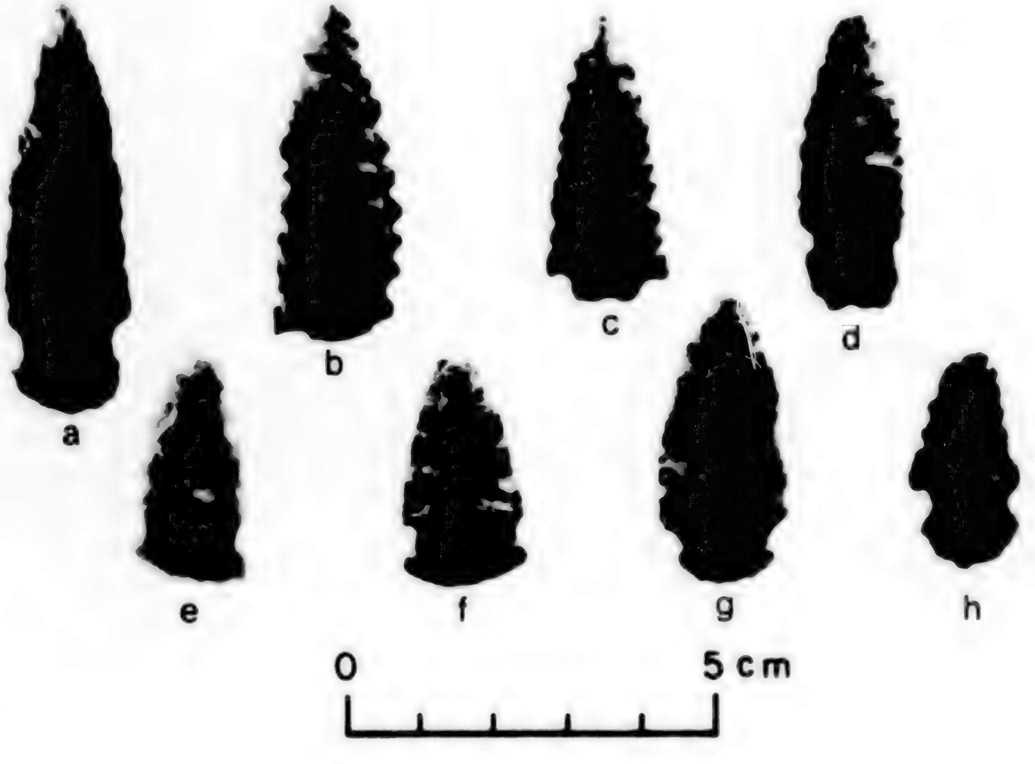

Figure 7.27. San Pedro.

The second projectile point of this type was collected as an isolated artifact from Unit 32S/06W (SN 076; Fig. 7.27b). This projectile point is lacking both the tip and the base. The chert from which it was manufactured resembles varieties that have been described for the Franklin Mountains. The blade margins are slightly convex with well-defined serrations. The shape in plan view is an elongated triangle and the cross section is lenticular.

One San Pedro projectile point was collected from LA 49359 (14S/28-29W, SN 298/303; Fig. 7.27c). This piece was fashioned from a chert that may have originated in the Franklin Mountains. The base is missing from this point, but there are still portions of the side notches and stem present. The shape in plan view is that of an elongated triangle with a lenticular cross section. The blade margins are relatively straight with well-defined serrations.

A fourth projectile point of the San Pedro type was collected from LA 49343 (10S/29W, SN 295; Fig. 7.27d). This point was manufactured from a black chert, which may have had its origin in the Franklin Mountains. The tip of this point is missing. One of the blade margins is relatively straight while the other is convex. The point has a waisted appearance similar to the points designated Beckett Type 6, but the side notches are somewhat better defined. The stem expands near the base, which is irregular in form. The overall shape in plan view is an elongated triangle. The cross section is plano-convex at the distal end but changes to an irregular form near the proximal end.

The fifth point assigned to this type was collected as an isolated artifact in Unit 20S/47W (SN 391; Fig. 7.27e). This projectile point was fashioned from a gray oolitic chert. This point is an elongated triangle in plan view and possesses somewhat shallow side notches. Both blade margins are convex. The stem expands strongly at the base. The base itself is irregular with one ear elevated above the other. The cross section of this point is lenticular.

Two San Pedro points were collected at LA 49364 (37S/05W, Point 1, SN 070; Fig. 7.27f). The first was manufactured from chert and is missing its tip. The shape in plan view is a slightly elongated triangle with shallow side notches. The stem expands at the base, which is strongly convex and shows indications of having been ground. The blade margins are straight and unserrated. The cross section is lenticular. The second San Pedro projectile point (#3) from LA 49364 was fashioned from a light brown chert. This point is an elongated triangle with shallow side notches. The cross section is lenticular and there is no evidence of grinding. Both blade margins are convex in form.

The eighth point of this type was recovered from LA 49372 (32S/13W, SN 140; Fig. 7.27g). This projectile point is missing its tip, possibly as a result of an impact fracture. This point was manufactured from chert and has an elongated plan view shape. Side notches set the blade off from the base. The stem is expanding and the base is the most strongly convex of all the examples in the collection.

Blade margins are straight with shallow serrations. The cross section is lenticular.

The last projectile point recovered of this type was collected as an isolated artifact in Unit 08S/17W (SN 180). Like all the others assigned to this type this point was also manufactured from chert. The tip and both tangs are missing. The shape in plan view is an elongated triangle. The cross section is lenticular all along its length. The shape of the blade margins are straight and the margins are shallowly serrated. The stem is expanding at the convex base.

Sayles and Antevs (1950) associated projectile points of the San Pedro type with the San Pedro Cochise stage in southwestern Arizona. At Ventana Cave Haury (1950: 289, Fig. 63) found San Pedro projectile points associated with the upper levels of the prepottery midden and in the earliest levels in which pottery was recovered. At Bat Cave Dick (1965) found a large variety of the San Pedro type associated with the upper preceramic levels and a smaller variety associated with the lowest ceramic bearing levels. Based on this information, projectile points of the San Pedro type are probably associated with Late Archaic sites and sites with an early ceramic component in the El Paso area.

Small Side-Notched

Two small side-notched projectile points were collected as isolated artifacts during the Santa Teresa survey. The first was recovered in Unit 57S/24W (SN 258; Fig. 7.28a). This projectile point was manufactured from a gray chert, which resembles those described as occurring in the Franklin Mountains. This specimen is triangular in plan view. The blade margins are straight and have well-defined side

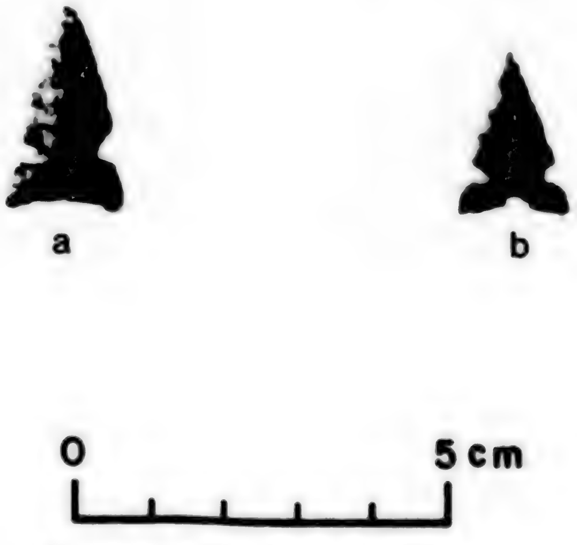

Figure 7.28. Small side-notched.

notches inset roughly two thirds of the way down the blade. The margins of the base expand, while the base itself is concave in form. There is some indication of grinding, and some hafting abrasion may be evident on the margins of the base and above the notches. The cross section varies from lenticular at the distal end to plano-convex at the proximal end of the piece.

The second point of this type was collected from Unit 45S/31W (SN 344; Fig. 7.28b). This projectile point was fashioned from a flake of light colored chert. The shape is triangular in plan view. The cross section is rhomboidal with considerable flake blank morphology still in evidence. The ears of the base are expanded and the base itself is concave with one well-defined notch set in its center. The side notches themselves are also well defined. The blade margins are straight and come to a relatively acute angle at the tip.

Bradley (1983) recovered several points of this type from the La Cabrana Site. This site was dated to the El Paso phase and is not far from the Santa Teresa study area. In the El Paso area, points of this type have been called "Harrell" (Carmichael 1982a), and they are found most commonly associated with Late Ceramic remains.

Maljamar

Two projectile points of this type were recovered during the Santa Teresa survey. The first was collected from Isolated Manifestation 1 in Unit 39S/00W (SN 024; Fig. 7.29a). This artifact is whole and was manufactured from chert. The stem expands slightly toward

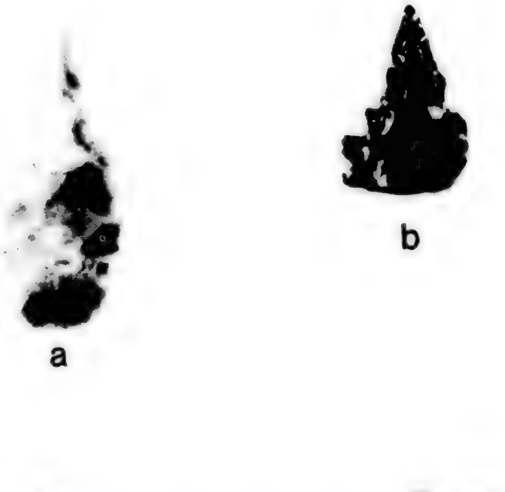

Figure 7.29. Maljamar.

the base, which is convex in shape. The cross section is rhomboidal at the proximal end, changing to lenticular at the distal end of the piece. Both blade margins are slightly convex and exhibit serrations on the upper half of the blade. The second point of this type was collected from LA 49352 (16S/02W, SN 046; Fig. 7.29b). This obsidian artifact is fragmentary, consisting of approximately the upper half of the blade. Like the first, there are serrations along the upper portion of the blade which comes to a sharp point.

The Maljamar type was defined by members of the Lea County Archaeological Society (Smith 1974) from surface survey in southeastern New Mexico. Although no points of this type were recovered from excavated contexts, based upon the size of the points they suggest an Archaic affiliation. However, Lehmer (1948) recovered one projectile point of the type from the Bradfield Site in the Tularosa Basin that he assigned to the El Paso phase. The other projectile points from this site are all of a different type, which suggests that the artifact that resembles the Maljamar type may be a scavenged point. Because no dating information is available in other sources, points of this type are best left unassigned to a temporal period.

Beckett Type 9

There were six projectile points from the Santa Teresa survey that were assigned to this type. The first of these was collected as an isolated artifact in Unit 35S/19W (SN 197; Fig. 7.30a). This projectile point was fashioned from gray chert which may be an example of one of the forms of chert from the Franklin Mountains. This specimen is missing one tang and a corner of the base. The stem is expanding at the base which is slightly convex in form. The blade has one margin which is irregular in shape; the other is slightly concave in form. There are well-defined corner notches that set the tangs off from the base and stem. The cross section is lenticular, while the overall shape in plan view is that of an elongated triangle.

Another isolated projectile point of this type was collected from Unit 32S/07W (SN 086; Fig. 7.30b). This projectile point is whole and was fashioned from a red-brown chert, with inclusions of quartz and chalcedony. This material is the "Laguna Agate" discussed earlier. The overall shape of the artifact in plan view is that of an elongated triangle. The cross section changes from rhomboidal at the proximal end to a lenticular form at the distal end of the piece. The stem expands at the base which is irregular convex in form. One blade margin is straight and the other is concave. Both margins possess shallow serrations down the length of the blade. The point has wide corner notches. The tangs do not extend downward towards the base as in the first example but flare outward.

A third isolated projectile point of this type was recovered from Unit 22S/00W (SN 096; Fig. 7.30c). This chalcedony projectile point is missing one corner of the base. The shape in plan view is an elongated triangle; the cross section is lenticular. The blade margins

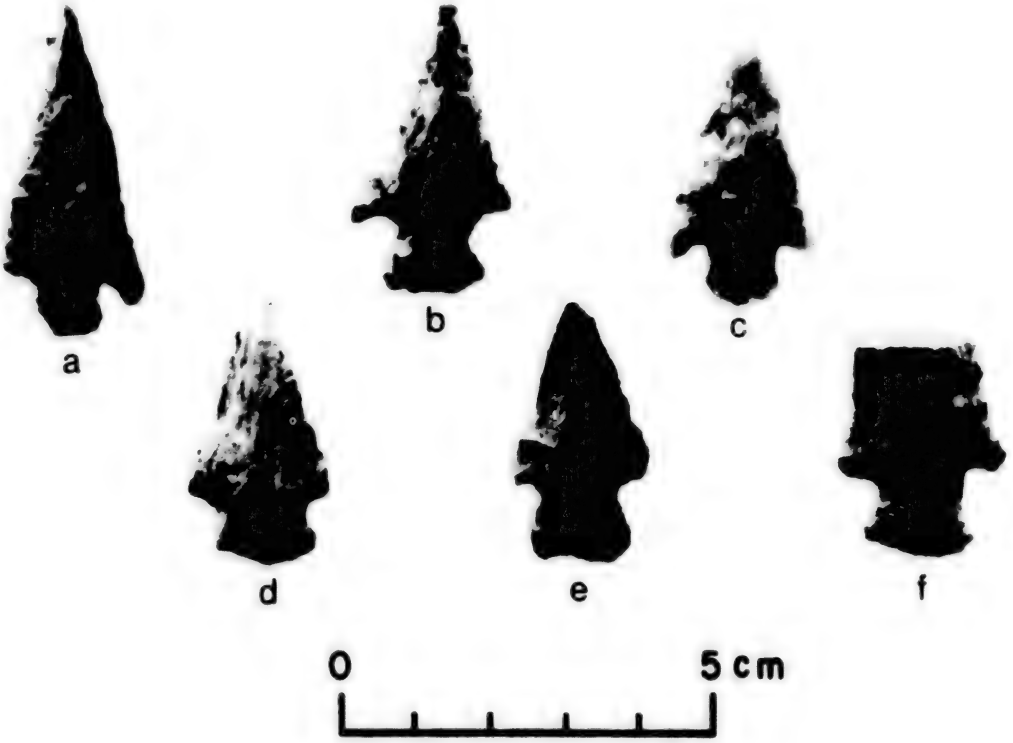

Figure 7.30. Beckett Type 9.

are straight and exhibit shallow serrations. The stem is expanding at the base which has an irregular form. This point possesses well-defined corner notches that set the tangs of the blade off from the upper part of the stem. The fourth point of this type was collected from LA 49385 (31S/14W, SN 432; Fig. 7.30d). This point was fashioned from a brown chert which is rather coarse in texture. The overall shape is that of an elongated triangle when seen in plan view. The stem expands at the base, which is convex in form. One margin of the blade is straight and has a beveled appearance, whereas the other margin is concave. The cross section is irregular. This irregularity is caused by the marginal nature of the retouch and the consequent retention of considerable flake blank morphology. The notches on this point are wide, creating an obtuse angle between the tangs and the upper part of the stem.

The fifth point assigned to this type was collected at LA 49338 (12S/30W, SN 310; Fig. 7.30e). The piece was manufactured from a gray chert that resembles those described as being present in the Franklin Montains. This point is missing the ends of both tangs. The shape in plan view is an elongated triangle. The blade margins are straight and the upper portion of the blade appears to have been reworked. The cross section is lenticular from one end of the point to the other. The stem expands at the base which is irregular in form. The corner notches on this point are very wide, creating an obtuse angle between the upper portion of the stem and the projected extent of the missing tangs. The last point assigned to this type was collected at LA 49347 (03S/28W, SN 290, Point 1; Fig. 7.30f). The chert from which this projectile point was manufactured is similar to cherts described as being from strata in the Franklin Mountains. This point is missing the upper half of the blade. The shape in plan view was probably an elongated triangle. The blade shape may have been slightly concave. The stem expands at the base, which is convex in form. The base has been ground and one ear is elevated above the other. The cross section is lenticular in form. This projectile point retains some flake blank morphology including some cortex on the base. The corner notches on this point are rather wide, which creates an obtuse angle between the tangs and the upper part of the stem.

Because the projectile points assigned to this type exhibit some variability, to facilitate comparisons with the existing literature they will be separated into two subtypes. The point from Unit 35S/19W (SN 197) and the point from Unit 22S/00W (SN 096; Fig. 7.30a and c) will be referred to as Beckett Type 9a. The rest of the points of this type will be referred to as Beckett Type 9b.

Both of these subtypes fall within the range of Beckett Type 9 (Beckett 1973: 81), although the notches are narrower than those illustrated. Beckett does not note a cultural or temporal affiliation for this type. The two Santa Teresa projectile points resemble to a slight degree Dick´s Type 5 (1965: 25, Fig. 20j and k) except that the angles of the notches differ and the bases of the Santa Teresa points are narrower in relation to the blade width. Dick (1965: 31) notes that points of this type occur in both the prepottery and pottery levels at Bat Cave. Haury (1950: 293, Fig. 65a-d) illustrates several points similar to the two Santa Teresa examples. These points were associated with the earlier levels in the midden. Using Jelinek´s (1967) typological system, the two Santa Teresa points type out to a H18WZ. Points of the H18 type are said to occur in the Early Mesita Negra phase, which Jelinek (1967) dates to about A.D. 1000 to 1100. The two Santa Teresa examples also resemble the large variety of San Pedro points illustrated by Carmichael (1982a: 80, Plate 8).

Given the above information, the two Santa Teresa projectile points designated as Beckett Type 9a are probably associated with the Late Archaic or early ceramic periods, or both, in the El Paso area. If the relationship to Jelinek´s (1967) Type H18 is accepted, this projectile point style may even extend into the early part of the late ceramic period.

The four projectile points designated here as Beckett Type 9b strongly resemble Dick´s (1965: 25) small San Pedro type. They may, however, fall into the larger end of the range (the upper cutoff for the smaller variety is not given). The bases on the Santa Teresa points appear to be slightly narrower than the small San Pedro varieties illustrated by Dick (1965: 24, Fig. 20l-n). Morphologically, the El Paso points more strongly resemble the smaller variety, but in size, may conform to the range for the larger points. The smaller variety is considered to be earlier than the larger. As noted above, points of the San Pedro type were found in both prepottery and pottery strata at Bat

Cave (Dick 1965). The isolated projectile point from 32S/07W (SN 086; Fig. 7.30b) resembles H16WZ using Jelinek's (1967) typological system. Points of the H16 type were restricted to the Early 18 Mile phase (about A.D. 700 to 900) in the Middle Pecos River Valley of eastern New Mexico. The one point from LA 49385 and the point from LA 49388 (Fig. 7.30d, 7.30e) appear to be a smaller variety of the H16 type. The point from LA 49347, however, appears to fit better within the H17 type (no further breakdown is possible owing to the fragmentary nature of the artifact). Large varieties of the H17 type are reported to be associated with Archaic sites in eastern New Mexico, and serrated varieties of the H17 type have been reported from sites of the Early McKenzie phase (approximate dates around A.D. 1250). O'Laughlin (1980: 196, Fig. 37a-e) illustrates three projectile points that resemble the four Beckett Type 9b points. The points illustrated by O'Laughlin (1980) are felt by him to date to the Mesilla phase. These four points also resemble the San Pedro points from the Tularosa Basin illustrated by Carmichael (1982a: 80), which he assigns to the Late Archaic and Late Archaic/Early Formative periods.

Based on the above information, the four projectile points assigned to the Beckett Type 9b category appear to be associated with Late Archaic and early ceramic periods in the El Paso area. Given this broad span of time, points of this type should not be considered to have significant temporal sensitivity.

Beckett Type 10

Ten projectile points from the Santa Teresa survey were assigned to this type category. One projectile point of this type was collected from LA 49382 (36S/10W, SN 132; Fig. 7.31a). This projectile point was manufactured from obsidian and is missing its tip, one tang, and one corner of the base. This projectile point has straight blade margins. The stem expands at the base. The overall shape of the artifact in plan view is that of an elongated triangle. Basal form is difficult to determine owing to breakage but it may have been slightly concave. The corner notches are deeply set, forming an obtuse angle between the end of the blade and the upper part of the stem.

An isolated projectile point from Unit 08S/20W (SN 411; Fig. 7.31b) was also assigned to this type. This artifact was manufactured from obsidian and is triangular in form. The blade margins are strongly convex and exhibit shallow serration. The stem expands at the base, which is concave in shape. The corner notches on this point are well defined and create an obtuse angle between the lower portion of the blade and the upper part of the stem.

The third projectile point placed in [illegible] type category was collected in Unit 38S/00W (FN 0020; Fig. 7.3[illegible] This artifact was manufactured from obsidian. In plan view the point is shaped like a slightly elongated triangle. The stem expands toward the base, which has one centrally located notch. One blade margin is convex; the other

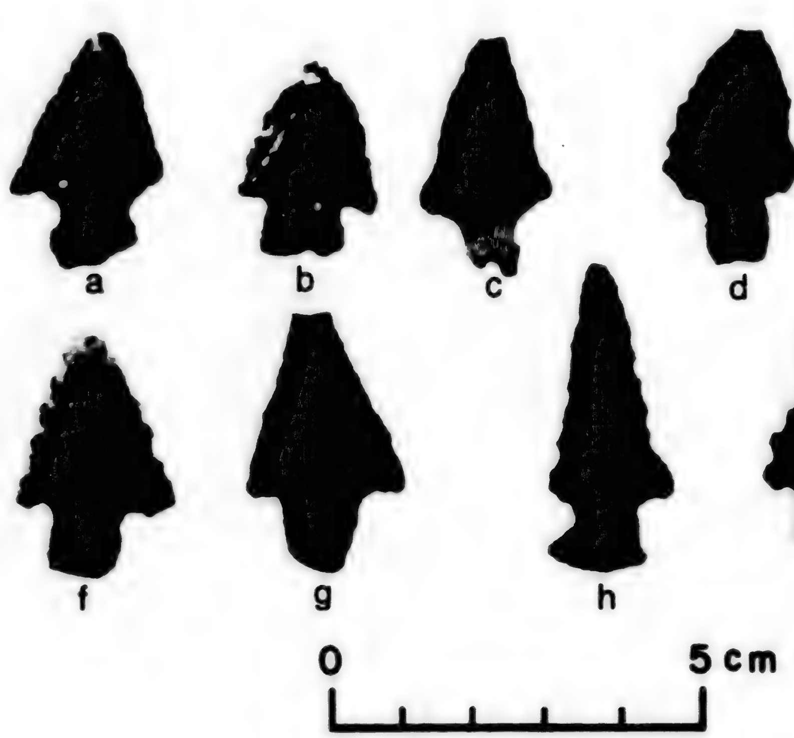

Figure 7.31. Beckett Type 10.

margin is irregular in form. The corner notches on this point produce an obtuse angle between the lower blade margins and the upper part of the stem.

Another point of this type was collected at LA 49354B (29S/02W, Point 1, SN 050; Fig. 7.31d). This point was manufactured from a grainy gray chert, which was probably eroded from a chert-bearing stratum in the Franklin Mountains. This point is roughly triangular in plan view and is missing the tip and one tang. The stem contracts slightly toward the base, which is slightly concave. One margin of the blade is irregular while the other margin is convex in form. The convex margin appears to be slightly serrated, but it is doubtful that this was deliberate. The serrated appearance is produced by a series of flake scars related to the thinning of the piece, which left prominent projections. The cross section of the artifact is irregular at the proximal end, but changes to a plano-convex form near the tip. The cross section is controlled by the morphology of the original flake blank, which is still quite evident. The piece has been only marginally retouched. Flaking along the stem has created an obtuse angle between the upper stem and lower portion of the blade to bring the edges in line.

Another isolated projectile point assigned to this type was recovered from Unit 07S/28W (SN 292; Fig. 7.31e). This point was manufactured from a banded chert, which may have come from some stratum in the Franklin Mountains. The shape in plan view is that of a slightly elongated triangle. One blade margin is straight and missing its tang, and the other is slightly concave. The stem expands toward the base, which is slightly convex. The piece has a lenticular cross section along its total length. A series of flake scars along the stem and lower blade margin have created an obtuse angle and well-defined tang.

A sixth point from LA 49381 (35S/08W, SN 105; Fig. 7.31f) was assigned to this type. This projectile point was manufactured from a welded tuff and is missing the ends of both tangs and the tip. The shape in plan view is that of a slightly elongated triangle. The cross section is lenticular. The corner notches on this artifact are well defined and create an obtuse angle that separates the upper stem from lower parts of the blade. The stem expands toward the base which is convex in shape. Both blade margins are straight and exhibit relatively shallow serrations.

The seventh point of this type was recovered from LA 49358 (14S/28-29W, Point 2, SN 298/303; Fig. 7.31g). This point was fashioned from a gray chert that grades to brown, which may have come from the Franklin Mountains. The overall shape of the artifact is that of an elongated triangle, and it is missing its tip. The shapes of both blade margins are slightly concave. The stem contracts toward the base, which is strongly convex and shows evidence of having been ground. One corner of the base is elevated above the other. A series of flake scars along the stem and lower blade margin have produced an obtuse angle and well-defined tangs on the lower blade margins. The cross section is lenticular.

An isolated projectile point collected from Unit 04S/20W (SN 200; Fig. 7.31h) was assigned to this type category. This complete projectile point was manufactured from a chert that may be one of the varieties described as occurring in the Franklin Mountains. This point is quite long and triangular in form. The shape of both blade margins is concave and both exhibit a series of shallow serrations. The tangs at the ends of the blade margins are well defined in part by the presence of deeply set corner notches. The stem expands toward the base. The base itself is strongly convex and one corner is elevated above the other. The cross section is rhomboidal as a result of a twist to the original flake blank. Some of the original flake blank morphology still remains on one face.

An isolated projectile point recovered in Unit 08S/25W (SN 254; Fig. 7.31i) was assigned to this type. This point was fashioned from a piece of gray chert that resembles types described as coming from strata in the Franklin Mountains. This serrated point is missing its tip. The overall shape in plan view is that of a slightly elongated triangle. The stem is straight. The blade margins are concave and have a series of well-defined serrations along the lower half. The cross section is rhomboidal at the proximal end and changes to a lenticular shape at the distal end. The corner notches create an obtuse angle between the tangs and the upper portion of the stem.

The last point of this type in the Santa Teresa collection was recovered from LA 49357 (12S/26W, Point 3, SN 271; Fig. 7.31j). The upper third of the blade of this obsidian projectile point is missing. The point is roughly leaf shaped in plan view. The shapes of the blade margins are difficult to determine because of the deep serrations. The stem expands greatly at the base, which itself is strongly convex. The corner notches on this point are well defined.

Considering the range of variation exhibited by the projectile points assigned to this type, a decision was made to break this collection of points into four subtypes, Beckett Types 10a through 10d, which group together points that most resemble each other. This was deemed a necessary measure to facilitate comparison of these projectile points with other projectile point types in the literature, because Beckett (1973) notes no cultural or temporal affiliation for his Type 10 points. The projectile point from LA 49382 (SN 132) and the isolated find from 08S/20W (SN 411; Fig. 7.31a and b) are here considered to represent Beckett Type 10a. These two projectile points resemble the smaller San Pedro variety as illustrated by Dick (1965: 24, Fig. 201-n). In the Santa Teresa collection, the base of the point from LA 49382 has been damaged but may have been straight to slightly concave, similar to the point from Unit 08S/20W. This basal form differs from the points illustrated by Dick (1965), which as a group possess straight to strongly convex bases. The ears of the example from Unit 08S/20W are somewhat less well-defined than those of the Bat Cave points. The blades of the Santa Teresa artifacts are less elongated triangles than the Bat Cave San Pedro points. The artifact from LA 49382 vaguely resembles one of the miscellaneous types of no known cultural affiliation illustrated by Fields and Girard (1983: 155, Fig. 53k). This point also somewhat resembles the Palmillas type illustrated by Suhm and Jelks (1962, Plate 115c) but has slightly better defined tangs. The point from 08S/20W lacks a resemblance in that the tangs are better defined and downsloping. There is a slim possibility that this type, which has approximate dates between 2000 B.C. and A.D. 700 to 800 in central Texas, may extend into the El Paso area as Carmichael (1982a: 84, Plate 11h-j) illustrates points from the Tularosa Basin that he assigns to the Palmillas type. Both of the Santa Teresa points resemble the Tularosa Basin examples in tang definition and stem and notching characteristics, but differ in that the blades are not as elongated in shape and lack the well-defined convex base. Jelinek (1967) does not illustrate points similar to the El Paso points. Concave based points were apparently found infrequently in the Middle Pecos River assemblages.

The two projectile points in the Santa Teresa collection that are here considered Beckett Type 10a may well be representative of a local variant of the smaller San Pedro variety. If this is in fact the case, a Late Archaic or early ceramic temporal affiliation seems likely.

Two projectile points are included in the Beckett Type 10b subtype. These two points are the isolated find from 38S/00W (FN 0020) and the point collected from LA 49354B (SN 050; Fig. 7.31c and d). The two Santa Teresa examples vaguely resemble one of Dick's (1965: 24, Plate 20g) Type 3 points, although the Santa Teresa examples have longer, straighter stems and would appear to be outside the length range for Dick´s type but within the width limits defined. At Bat Cave, Type 3 points were restricted in their distribution to the upper pottery levels. The two Santa Teresa points also vaguely resemble the Alba point type illustrated by Suhm and Jelks (1962: 264, Plate 132), but do not have the well-defined, semi-elongated tangs. On the El Paso points, the greater basal-stem width-to-blade ratio also differs from those of the Alba type. The distribution of the Alba type appears restricted to the eastern part of Texas (Suhm and Jelks 1962: 263), and it is doubtful that it ever reached the El Paso area. No additional comparisons could be made to points illustrated or described in the other literature consulted.

Considering the deviations from Dick´s (1965) Type 3 and lacking any better sources for comparison from the El Paso area it is best to consider these two points to be affiliated with some as yet undefined local tradition. A probable temporal affiliation for these projectile points can not be given using the available information.

The isolated projectile point from 07S/28W (SN 292), the artifact recovered from LA 49381 (SN 105), and the point collected from LA 49358 (SN 298/303; Fig. 7.31e-g) represent another subtype, here labeled Beckett Type 10c. These three projectile points somewhat resemble the Augustin points from the Tularosa Basin illustrated by Carmichael (1982a: 76, Plate 4c-g), but with the exception of FN 5133 lack the steeply contracting stem. The Augustin forms illustrated by Dick (1965: 28, Fig. 22l-r) are even more extreme in this attribute and do not, therefore, compare well with the Santa Teresa points. There is also a vague resemblance to the Perdiz type (Suhm and Jelks 1962: 284, Plates 1 and 2, specifically g) but the steeply contracting stem is again absent. Carmichael (1982a: 86, Plate 13f) also illustrates one point of the Perdiz type from the Tularosa Basin to which he assigns a Late Formative date. The three Santa Teresa points are similar to each other but different from two types that have been defined in the literature. The Augustin type is considered to be a Middle Archaic form (Carmichael 1982a; Dick 1965) while the Perdiz type is said to fall within the period spanning A.D. 1000 to 1500. In view of this, it is best to leave the three Santa Teresa examples without a known or assumed temporal affiliation.

Three projectile points have been assigned to the subtype Beckett Type 10d. These points are the isolated find from Unit 04S/20W, a second isolated find from 08S/25W (SN 254), and the partial point collected from LA 49357 (SN 271; Fig. 7.31h-j). This point from 04S/20W (Fig. 31h) somewhat resembles one member of the larger San Pedro variety as illustrated by Dick (1965: 24, Fig. 20r), but the Santa Teresa point has a better defined tang and a much more heavily serrated blade than the Bat Cave example. The other two Santa Teresa points have no good comparisons with any of the Bat Cave types. Carmichael (1982a: 80, Plate 7) illustrates a number of San Pedro points from Cienega Creek that he assigns to the Late Archaic period. These points bear a strong resemblance to the three Santa Teresa points under discussion. None of the points illustrated by Carmichael (1982a: 80), however, possess the well-defined serrations seen on the point from LA 49357 (Fig. 7.31j).

The point from 04S/20W, using Jelinek's (1967) typology, resembles a L16SWZ, that in the Middle Pecos River Valley of eastern New Mexico, the L16S type was restricted in its occurrence to the Early 18 Mile phase (dating to about A.D. 800; Jelinek 1967: 146). Using the same typological system the point from 08S/25W resembles a J9S. Jelinek (1967) does not note any serrated varieties within the J9 type. One J9 variety is found on Archaic sites in eastern New Mexico, and a variety with a more elongated blade is found on sites dating to the Late Mesita Negra phase (about A.D. 1100 to 1200). The point from LA 49357, using Jelinek's (1967) typology, resembles H4S. Points of the H4 type appear to be restricted to the Archaic period in the Middle Pecos area.

Considering the above information, a Late Archaic affiliation for the 04S/20W point and the point from LA 49357 seems likely. The point from 08S/25W on the other hand may have an Archaic affiliation, but if one follows Jelinek (1967) similar forms may also occur in the Late Formative period. Since the Santa Teresa examples bear a very strong resemblance to the Cienega Creek San Pedro forms illustrated by Carmichael (1982a: 80), these points are here assigned a Late Archaic affiliation.

Miscellaneous Types

During the Santa Teresa survey, eight projectile points were recovered that are single representatives of several types. Two of these projectile points, and perhaps one other, belong to types that have been described as markers for periods of the Oshara Tradition (Irwin-Williams 1973). Points of the Oshara Tradition are not unknown in the El Paso area (for example, Carmichael 1982a). The first of these is a fragment of a stem and base from a Jay phase projectile point. This artifact was collected from Isolated Manifestation 1 in Unit 05S/31W (SN 318; Fig. 7.32a). This artifact was manufactured from a fine-grained basalt and has a lenticular cross section. The stem contracts gently toward the base, which is straight in form. The basal margin and the margins of the stem are heavily ground. This point is the only artifact that suggests a possible Early Archaic occupation in the Santa Teresa study area. In the northern Southwest, points of this type have been dated to the period from 5500 to 4800 B.C. The second projectile point that is similar to one of the Oshara types was collected as an isolated artifact in Unit 07S/19W (SN 196; Fig. 7.32b). This is a fragment of a base and stem from a San Jose projectile point. This point was fashioned from obsidian and exhibits a straight stem and a deeply concave base. In the northern Southwest, points of this type have been dated to the period falling between 3300 and 1800 B.C. This type is a good indicator for a Middle Archaic occupation of the study area. Carmichael (1982a) associates projectile points of the Armijo type with Middle Archaic occupations in the El Paso area, although he does not illustrate any such forms recovered during the Fort Bliss survey. The projectile point recovered from LA 49338 (12S/30W, SN 310; Fig. 7.32c) is here tentatively assigned to the Armijo type. It is recognized, however, that this point may represent a variant of an existing but undefined type in the El Paso area. This point was

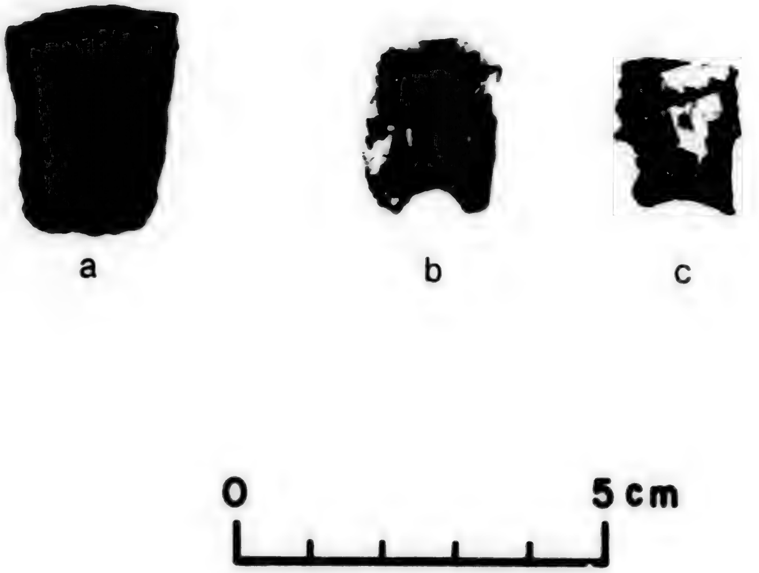

Figure 7.32. Oshara types.

fashioned from a chert of very good quality. The upper half of the blade is missing. The blade margins exhibit shallow closely spaced small serrations. The shoulders are well defined and the stem flares outward slightly at the base. The base itself is concave in form. Evidence of grinding is present on both the stem and the base.

Five other projectile points were recovered that represent miscellaneous types. These artifacts are shown in Figure 7.33. The first projectile point was recovered from LA 49353 (04S/27W, SN 279; Fig. 7.33a). This item is a fragment of a Folsom point, which was fashioned from a gray chert. This fragment exhibits the remains of a fluting scar on both faces. A portion of the "nipple" used as a platform from which one of the flutes was initiated is still visible in the basal concavity. The retouch on the margins was performed after the production of the flutes and probably served to finish the margins. Evidence of grinding is preserved on the ear of the base and the remaining part of the blade margin. Projectile points of this type are associated with the Folsom Paleo-Indian culture, which has been dated to 8800 to 7300 B.C. (Nelson 1980).

One projectile point was assigned to Beckett Type 5 (Beckett 1973: 80). This artifact is illustrated in Figure 7.33b. This obsidian projectile point was collected from LA 49379 (38S/09W, SN 127). The piece has shallow side notches, which create a somewhat waisted appearance to the stem. The stem itself expands at the base which is irregular-convex in form. The point is missing at least the upper half of the blade. Beckett (1973) does not assign a temporal or cultural affiliation to points of this type. Carmichael (1982a), Dick (1965), Fields and Girard (1983), Jelinek (1967), and Suhm and Jelks (1962) were all consulted and no good comparisons to the Santa Teresa point were

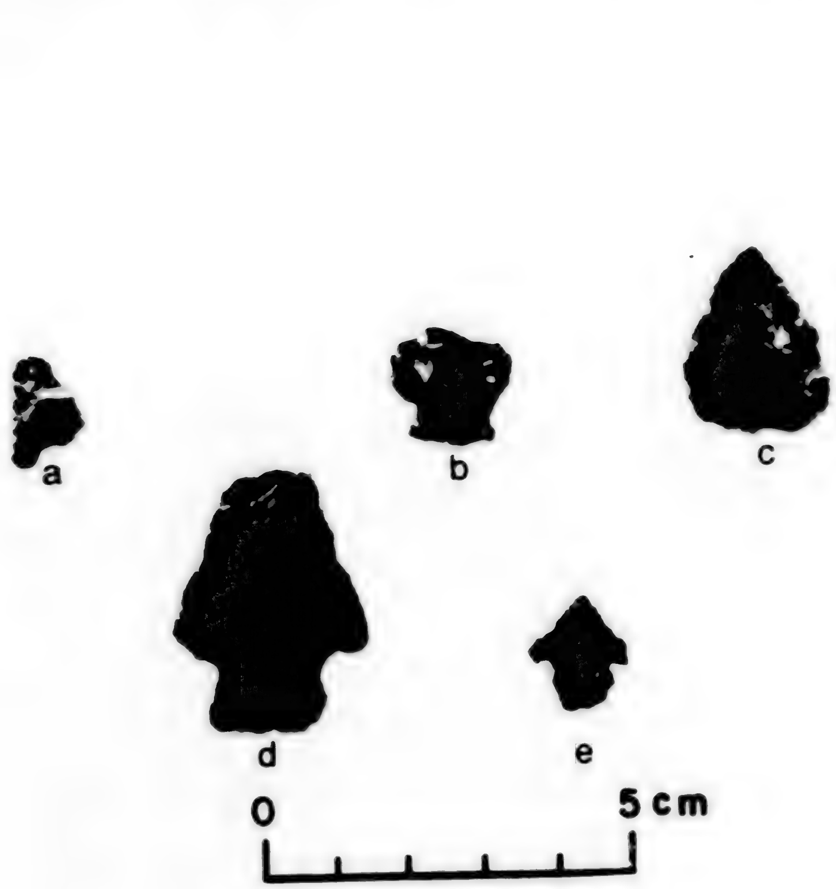

Figure 7.33. Miscellaneous types.

noted. Owing to the fragmentary nature of this point, Jelinek's (1962) typological method could not be used. Haury (1950: 282, Fig. 60e) illustrates one point from Ventana Cave that bears a resemblance to the point described here. The Ventana Cave point, however, lacks the waisted stem and well-defined basal ears seen on the Santa Teresa point. At Ventana Cave these points were found throughout the pottery levels. Based on the projected size of this incomplete point, a Late Archaic or Early Formative association seems likely but by no means certain. Because of a lack of comparisons in the literature and the lack of dates from the Santa Teresa site, this point is best considered to have no temporal sensitivity.

A third projectile point from Unit 03S/31W (SN 316; Fig. 7.33c) was included as a miscellaneous type. This point was categorized as "Unnamed Type A." This artifact was fashioned from a light gray obsidian and is shaped like a triangle with rounded basal corners. Both blade margins are strongly convex and the base is irregular. Beckett (1973) does not illustrate any points similar to this type. Beckett (personal communication) did, however, note that points of this type are commonly found on sites with El Paso Brown ceramics. It may fit into the range illustrated by Dick's (1965: 27) Type 11, which he describes as "triangular tending to leaf-shape in general outline; base rounded to straight; sides vary from straight to convex, ranges throughout fill." Sayles and Antevs (1941) note similar points in the Chiricahua stage in southeastern Arizona, and Haury (1950) found similar artifacts in Papago through Chiricahua-Amargosa II strata at Ventana Cave. Points of this type have also been found throughout the Mogollon period as reported by Martin (Martin and others 1950a, 1950b, 1949) and from the Mimbres phase in the Mimbres Valley (Cosgrove 1932). The Santa Teresa point resembles Jelinek's (1967) preform shape A1, which occurs in all phases in the Middle Pecos River Valley and was therefore considered not to be temporally diagnostic. Beckett (personal communication) stands out as the only individual who chooses to assign a limited temporal period to this type. Based on the above information, it is doubtful that this projectile point type, if in fact it is a projectile point at all, has any temporal sensitivity.

One projectile point from LA 49343 (10S/28W, Point 3, SN 295; Fig. 7.33d) was placed in the Beckett Type 7 category. This projectile point was manufactured from a reddish-brown chert. The point is missing the upper third of the blade. The shape of both blade margins is slightly convex. The corner notches are wide, which creates an obtuse angle between the upper part of the stem and the lower portion of the blade. The stem expands at the base, which is straight with some slight irregularities. The cross section is lenticular at the proximal end of the piece and irregular at the break on the blade. This irregularity in cross section is a result of the presence of a concavity on one face which was created by a hinge fracture on one face of the bifacial blank. Beckett (1973) notes no known cultural affiliation for points of this type. Fields and Girard (1983) and Carmichael (1982a) reports provided no good comparisons to the Santa Teresa artifact. The piece does resemble Dick's (1965: 25) Type 5 except that the notches are wider, the tangs are less pointed or well defined, and the corners of the base less well defined. Type 5 points were associated with both the prepottery and pottery levels at Bat Cave. Haury (1950) found similar points at Ventana Cave and considered them late. Other researchers (Cosgrove 1932 and Nesbitt 1931) noted points of this type as common on Mimbres Phase sites in the Mimbres Valley. This point also bears a slight resemblance to the Ellis type illustrated by Suhm and Jelks (1962) except that the notches are wider and the base is narrower, giving the tangs a better defined appearance. They date this point type to between 1000 B.C., or earlier, and A.D. 500 to 1000. Using Jelinek's (1967) typological system this point, compares to a J16Z, which he notes is restricted to Archaic phases in eastern New Mexico. Considering this information, points of this type may be found associated with Archaic or ceramic assemblages in the El Paso area. It is doubtful that this type has any temporal sensitivity.

A small corner-notched projectile point was recovered from LA 49354B (29S/02W, SN 050; Fig. 7.33e). This small obsidian point is missing the ends of both tangs and both corners of the base. In plan view the shape is that of a triangle with an expanded base. The shape of both blade margins is concave. The stem expands at the base, which appears to have been convex in form. Points of this type are frequently associated with Pueblo occupations in the northern Southwest. Haury (1950: 293, Fig. 65g) illustrates one projectile point that vaguely resembles the Santa Teresa artifact. However, the Ventana Cave point possesses a concave rather than convex base, is larger in size, and has blade margins that are convex rather than concave. Points of this type were found throughout the pottery levels at this well-known site. No further comparisons could be made to points illustrated in local and nonlocal sources. The small size of the Santa Teresa example suggests a late ceramic temporal affiliation. However, because evidence concerning the stratigraphic position of points of this type is not available for the local area, it is best considered to have little if any temporal sensitivity.

Twenty-three of the projectile points in the Santa Teresa collection could not be assigned to a specific type category and were recorded as "Unidentified Type" in the course of the analysis. Seventeen of these projectile points are illustrated in Figures 7.34 to 7.37. Artifacts of similar form were grouped together in the photos and will be described individually below with a possible temporal-cultural affiliation given for each point or group.

One projectile point of an unidentified type was recovered as an isolated artifact in Unit 04S/30W (SN 308; Fig. 7.34a). This point was manufactured from a dark gray chert that resembles one of the cherts described as occurring in strata in the Franklin Mountains. This projectile point has a blunt tip that resulted from reworking of the upper half of the blade. The point is leaf shaped in plan view with strongly convex blade margins. The stem expands at the base. The base itself is concave with well-defined ears. Grinding is evident in the

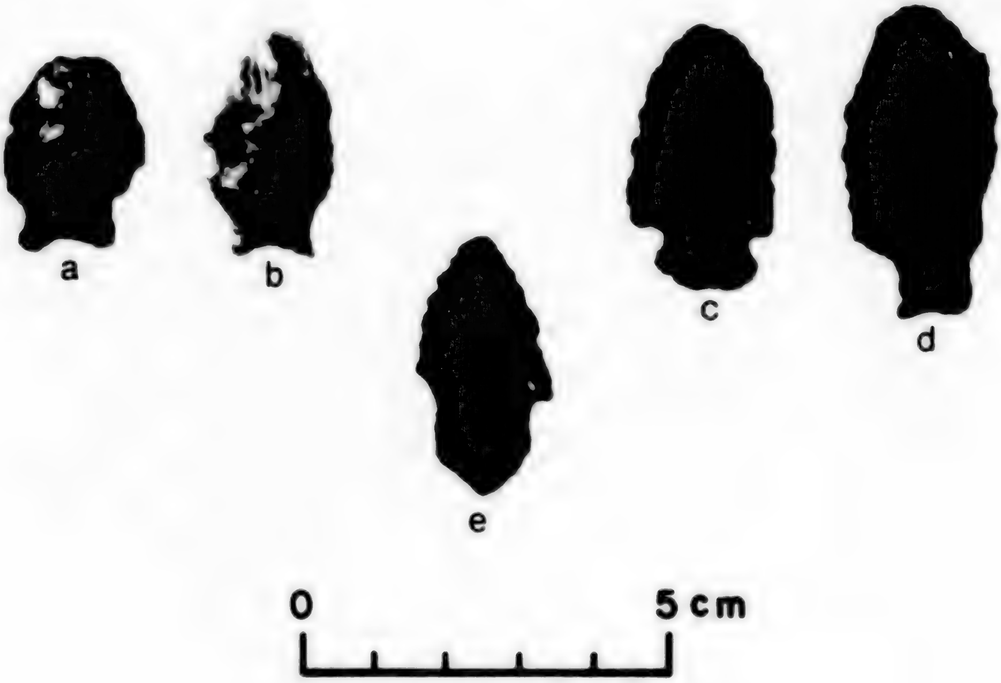

Figure 7.34. Unidentified types.

basal concavity and on the stem margins. The cross section of this artifact is lenticular. A second projectile point like the one just described was recovered from LA 49339 (04S/30W, SN 308; Fig. 7.34b). This whole projectile point was manufactured from chalcedony. The stem is short relative to the length of the blade and expands at the base. The base itself is concave with well-defined ears. The blade margins are strongly convex and come together sharply at the tip. The cross section is rhomboidal at both the proximal and distal ends of the artifact. These two projectile points vaguely resemble one Chiricahua point illustrated by Dick (1965: 26, Fig. 24n), but do not possess quite as deeply an indented base, nor as well-defined, sharp shoulders, the shoulders being rounded instead. These two projectile points may in fact be local variants of the Chiricahua type, but considering the differences noted here, such a type assignment is inadvisable without additional, confirming information in the form of carbon-14 dates, and so forth. These two points are best left untyped, with no known temporal sensitivity.

One projectile point of an unidentified type was recovered from LA 49358 (14S/28-29W, Point 4, SN 298/303; Fig. 7.34c). This projectile point was manufactured from obsidian and has a diamond shape in plan view. One blade margin is straight while the other is slightly convex. Both blade margins exhibit shallow serration. The stem form is straight contracting at the base to form a point. This projectile point vaguely resembles three of the Augustin points illustrated by Carmichael (1982a: 76, Plate 4c-e) and the Augustin type and its variants as illustrated by Dick (1965). It differs from these in that it possesses a relatively straight stem that contracts rapidly toward the base about half way down its length giving the base a triangular appearance, much more pointed than any of the points illustrated in these publications. The blade is serrated as are some of the smaller examples illustrated by these authors. It is possible that this point may be a local Augustin variant but lacking precise dating and a larger sample, this assignment is highly tentative. Suhm and Jelks (1962) illustrate some projectile points that approach this point's form, but all types illustrated by these authors were noted to occur solely in eastern Texas, too far removed from the El Paso area to be applicable here. The other references consulted illustrated no projectile points comparable to the one shown here. Considering the differences between this point and those of the Augustin type, it seems inadvisable to assign the Santa Teresa point to this type. It is impossible to say if this point is a local variant of the Augustin type or a representative of another unnamed local type. It is considered here to have no known temporal sensitivity.

Two projectile points that resemble each other were assigned to the unidentified type category. The first was collected from LA 49327 (23S/38W, SN 358; Fig. 7.34d). This artifact was fashioned from a flake of obsidian that was derived from a small cobble. Considerable flake blank morphology remains on this point, which has been retouched only in the area of the base and along the lower blade margins in the area of the corner notches. In Figure 7.34d the ventral face of the original flake blank is easily recognized. On the opposite face an alluvial cobble cortex is present on all areas of the blade. The shape of this artifact is elliptical in plan view. Both blade margins are strongly convex and come together to form a blunt tip. The stem expands at the base, which is strongly convex. A second point that somewhat resembles the first was recovered from LA 49343 (10S/28W, Point 4, SN 295; Fig. 7.34e). This poorly formed projectile point was manufactured from a fine grained basalt. The shape in plan view is irregular the shape being controlled by the irregularity of the convex blade margins. The stem is irregular in form, one side of which exhibits a very wide corner notch. The base itself is slightly concave. The cross section is irregular. In the literature reviewed, there were no good comparisons to the point from LA 49343. The only resemblance to the point from LA 49327 is Jelinek's (1967) Type B15Z to which he assigns an Archaic affiliation. This would be a tentative type assignment as the B15Z type has less severely convex blade margins. Lacking any good comparative information, these two points are considered here to have no known temporal sensitivity.

Two small triangular points were assigned to the unidentified category. The first was collected as an isolated artifact in Unit 51S/07W (SN 089; Fig. 7.35a). This point was manufactured from obsidian. The shape of both blade margins is convex and the base of the artifact is also convex with some irregularities evident. The blade margins converge to form a sharp tip. The second point with a similar

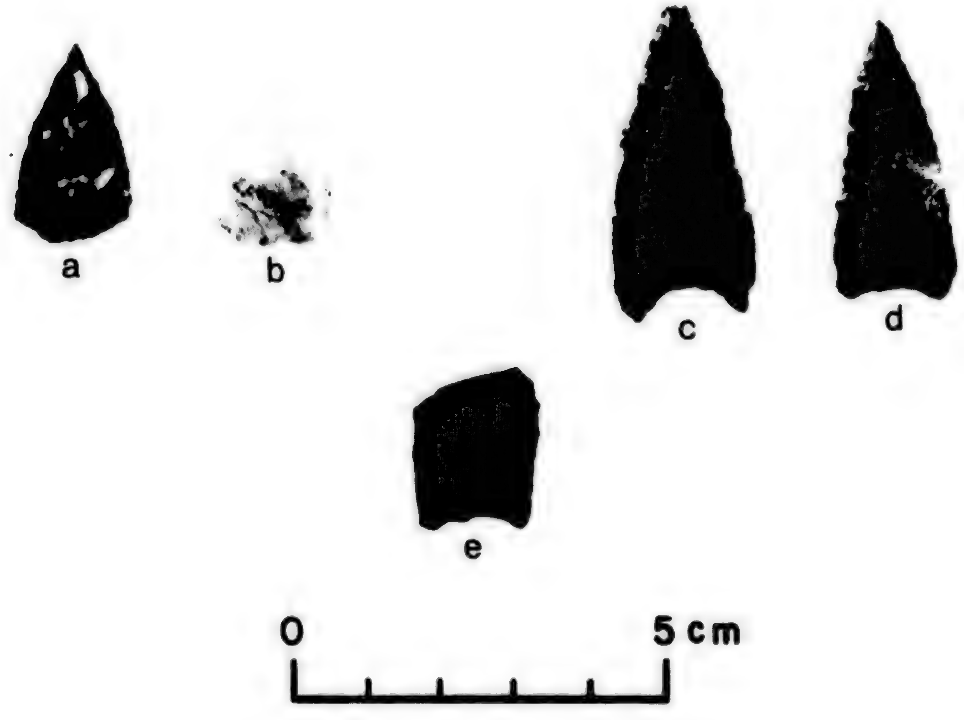

Figure 7.35. Unidentified types.

morphology was recovered as an isolated artifact in Unit 22S/07W (SN 085; Fig. 7.35b). The point was manufactured from a piece of partially mineralized fossil bone. It is similar in all respects to the first described here except that the tip is more blunt. These two points strongly resemble Dick's (1965: 26, Fig. 21o-u) Type 11, but the one from 22S/07W falls below the stated range for length. There is also a resemblance to the Catan and Matamoros types illustrated by Suhm and Jelks (1962: 175, Plate 88; and 215, Plate 108, respectively), but the El Paso points lack the distinctive beveling of one or both blade margins typical of these types. These points also resemble Jelinek's (1967) preform type A1 found in all phases on the Middle Pecos River. No comparisons were possible to any points illustrated in the other sources consulted. Given the distribution of this type throughout the Bat Cave strata and in historic to Archaic contexts in other areas, the type is best considered to have little or no temporal sensitivity until these small triangular points are found in stratified, dated contexts in the El Paso area.

Two relatively large triangular points, which resemble each other, were also included in the unidentified category. The first of these was collected as an isolated artifact in Unit 26S/17W (SN 182; Fig. 7.35c). This whole projectile point was manufactured from a reddish orange chert with chalcedonic inclusions that resembles the type known as "Laguna Agate." The base itself is strongly concave with well-defined ears. The cross section is lenticular. The second point was recovered from LA 49358 (14W/28-29W, Point 3, SN 298/303; Fig. 7.35d). This artifact was manufactured from a light brown chert. It has one convex blade margin and one straight margin, and both margins exhibit shallow serrations along most of their length. The blade margins expand gently towards the base, which is concave in form. The ears on the base of this point are not as well defined as the one previously described. The cross section is lenticular at the proximal end and rhomboidal at the distal end. In consulting Fields and Girard (1983), the closest comparison is to their Group 1. This group consists of four specimens from four distinct proveniences, including the surface, so no reliable date can be assigned. These two points somewhat resemble the Matamoros, Tortuga, and Meserve types as illustrated by Suhm and Jelks (1962), but the El Paso points lack the beveled blade margin(s) typical of these types. Haury (1950, Plate 22) illustrates at least one projectile point that is almost identical to the two Santa Teresa specimens. The Ventana Cave point was found in the upper layers of the site, which have been attributed to a Papago occupation. Carmichael (1982a: 78, Plate 5) illustrates several points of the Amargosa type, which the two El Paso points slightly resemble. However, the Santa Teresa points lack the slightly shouldered appearance of the points in the illustrations. Jelinek's (1967) preform Type F1 slightly resembles the two Santa Teresa points. These preforms are restricted to the Early and Late McKenzie phases (A.D. 1250 to 1350). No other comparisons were noted in the other references consulted. Considering the wide range of dates for those points with which comparisons were made it seems inadvisable to consider these points temporally sensitive until better dating information is available for the El Paso area.

One stem fragment of an obsidian projectile point was assigned to the unidentified category. This fragment was collected as an isolated artifact in Unit 00S/20W (SN 198; Fig. 7.35e). The stem is slightly contracting and the base is slightly concave. At first glance this basal fragment resembles the Bajada type of the Oshara Tradition (Irwin-Williams 1973; see Hicks [1982, 1984] for complete type description). Closer examination reveals that the stem margins lack the heavy grinding so characteristic of this type. This point may be an early San Jose variant. It does not, however, compare well to the local San Jose points illustrated by Carmichael (1982a), lacking the waisted stem and well-defined basal ears. Until more information is available concerning the range of variation of early San Jose projectile points in the El Paso area this artifact is probably best left untyped.

A very large projectile point fashioned from a type of chert that resembles some of those described as occurring in the Franklin Mountains was collected as an isolated artifact in Unit 35S/15W (SN 150; Fig. 7.36a). An unknown amount of the blade is missing. The blade margins are relatively straight and expand gently towards the proximal end of the artifact. The stem of the artifact expands toward the base, which is straight in form with one corner elevated noticeably above the other. The cross section is lenticular from end to end. The corner

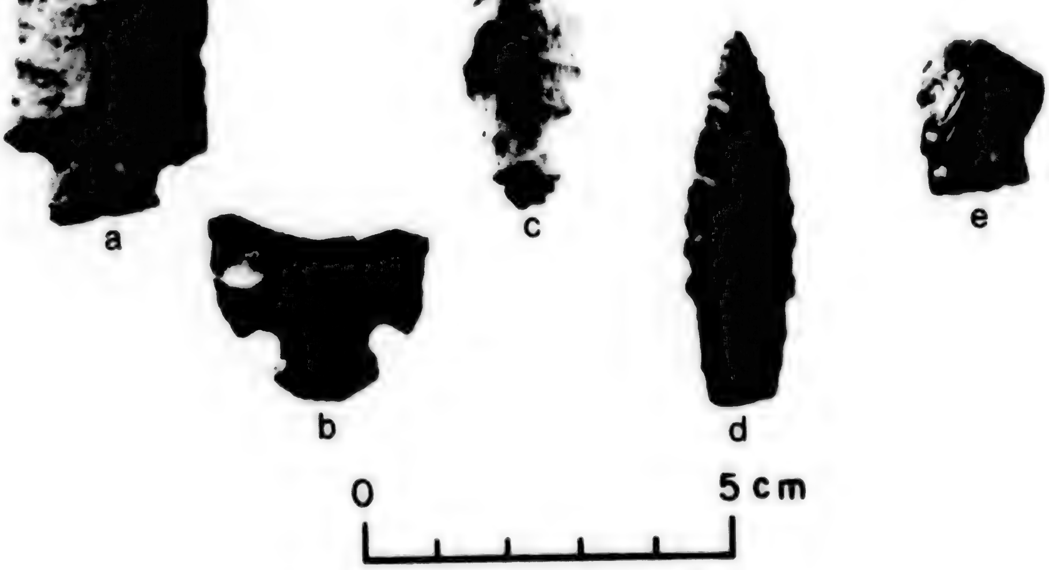

Figure 7.36. Unidentified types.

notches create a wide angle between the lower blade margin and the upper part of the stem. This artifact resembles one point illustrated as Type 9 in Beckett (1973), but bears no resemblance to those points typed here as Beckett Type 9. Beckett Type 9 has no known cultural affiliation (Beckett 1973). The point somewhat resembles the larger San Pedro varieties illustrated by Dick (1965: 24, Fig. 20r-u) and Carmichael (1982a). Haury (1950: 291, Fig. 64c) illustrates one projectile point which he views as a San Pedro variant that looks almost exactly like the Santa Teresa artifact. Given this information the Santa Teresa artifact is here considered to be a variant of the San Pedro type. Following Carmichael (1982a) this type is viewed as being associated with Late Archaic and early ceramic occupations in the El Paso area.

A fragment of a projectile point estimated to be quite large was collected as an isolated artifact in Unit 26S/45W (SN 372; Fig. 7.36b). This artifact was manufactured from a dark gray chert with light gray mottles. The blade margins on this projectile point appear to have been strongly convex in form. The corner notches are well defined and separate the tangs from the upper part of the stem. The stem expands at the base, which is strongly convex. The cross section is lenticular. This projectile point resembles at least one point of the Williams type illustrated by Suhm and Jelks (1962: 260, Plate 130e). The distribution of this point is said to be common in central Texas, with occasional occurrences in eastern and coastal Texas. The time span is noted as 4000 B.C. to A.D. 1000. It is doubtful that the Williams type extended southwest into the El Paso area. None of the other references consulted described any points similar to the one from the Santa Teresa collection. Considering its projected size an Archaic or early ceramic association is possible but tenuous until more is understood of the temporal affiliation in the El Paso area.

An isolated projectile point collected from Unit 08S/31W (SN 321; Fig. 7.36c) was assigned to the unidentified category. This artifact was manufactured from a fine-grained igneous rock which could not be identified. This point has an irregular cross section that is caused by incomplete reduction of the flake blank. What was the dorsal face of the flake still exhibits 20 percent cortex on its surface. The ventral face of the flake has been retouched only along the margins. The blade margins are concave-convex. One shoulder is elevated markedly above the other. The stem expands at the base which is irregular-convex in form. However this point vaguely resembles the Augustin type as illustrated by Dick (1965: 28, Fig. 221-r) except that the blade margins are convex rather than straight. This point in no way resembles the Augustin points illustrated by Carmichael (1982a) for the southern Tularosa Basin. No similarities were noted to projectile points illustrated in other sources. Considering the differences between this point and points of the Augustin type it is inadvisable to assign the point to this type. It, therefore, can not be attributed any temporal sensitivity at this time.

An isolated projectile point recovered from Unit 33S/00W (SN 018; Fig. 7.36d) is stemmed with a lanceolate shape when viewed in plan view. The artifact was manufactured from a dark gray chert that resembles some of those described as coming from the Franklin Mountains.

The blade margins are convex and end in shoulders. Both blade margins exhibit shallow serrations. The stem margins are straight and contrast slightly toward the base. The base itself is somewhat irregular with one corner elevated above the other. The flaking pattern is quite regular, which has produced a cross section that is diamond shaped. This point somewhat resembles Beckett Type 8 (Beckett 1973: 101) except that the shoulders are less well defined, but the stem is not waisted in appearance and the base does not flare out like the artifact illustrated. Beckett Type 8 has no known cultural affiliation. Haury (1950: 285, Fig. 61e) illustrates one point of the Pinto or Amargosa II type that looks very similar to the Santa Teresa artifact. The two points differ in the degree of definition of the shoulders, those on the Ventana Cave example being better defined. This point also resembles some of the Morril type illustrated by Suhm and Jelks (1962: 224, Plate 112). However, the distribution of this point type is said to be restricted to the central portion of east Texas with infrequent occurrences in east-central Texas. It is unlikely that it ever reached the El Paso area. Based on the almost identical morphologies of the Santa Teresa point and the Ventana Cave example, this artifact is here assigned to the San Jose-Pinto type. Carmichael (1982a) assigns points of this type to Middle Archaic occupations in the El Paso area.

An obsidian projectile point from LA 49354A (28S/02W, Point 4, SN 049; Fig. 7.36e) was assigned to the unidentified category. This projectile point fragment is very irregular in form. The base is straight with one corner elevated above the other. The blade margins appear to have been convex. Projection of the blade margins reveals that the tip of the whole point would have been considerably out of line with the longitudinal axis of the point. No comparisons could be made to any of the projectile points illustrated in the references consulted. Because this point could not be typed, no temporal affiliation can be defined.

An isolated projectile point from 54S/06W (SN 081; Fig. 7.37a) was assigned to the unidentified type category. This artifact was manufactured from a rhyolite with a fine fabric. The artifact is leaf shaped in plan view. The blade margins are convex in shape widening to form slight shoulders. One margin of the stem is straight and the other contracts toward the base. The base itself is irregular with one corner noticeably elevated above the other. The cross section is lenticular at the proximal end changing to an irregular shape near the tip. This point slightly resembles one illustrated by Dick (1965: 26, Fig. 21p) except that the Bat Cave example has a strongly convex base and lacks shoulders. Points of this type were recovered throughout the Bat Cave strata. Lacking any other information on points of similar form no temporal affiliation can be suggested at this time.

A projectile point collected as an isolated artifact in Unit 16S/26W (SN 273; Fig. 7.37b) was manufactured from a fine fabric rhyolite. The overall shape of this artifact approaches a diamond shape in plan view. One margin of the blade is straight, while the other is convex in form. Both margins end in slight shoulders. The stem contracts toward the base, which is straight. The cross section on this piece is irregular due to considerable remaining flake blank morphology.

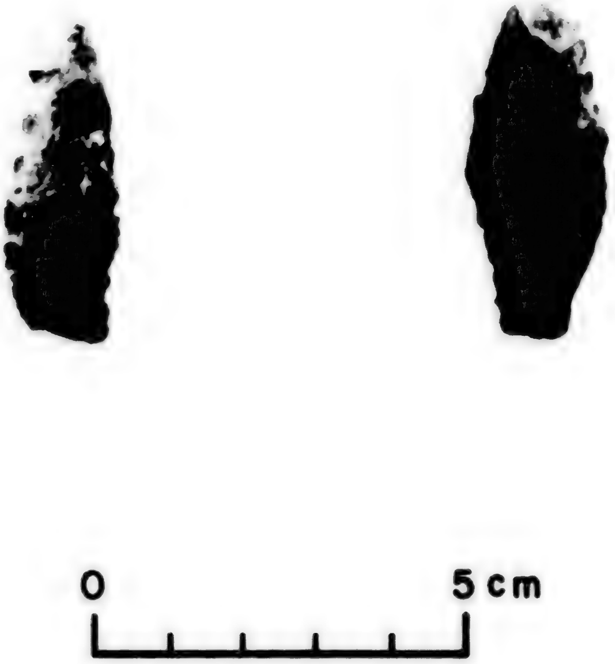

Figure 7.37. Unidentified types.

The tip of this point has been reworked. This projectile point bears a close resemblance to a projectile point recovered by O'Laughlin (1980: 196, Fig. 37g) in an Archaic context at a site near Keystone Dam. The point recovered from the Keystone Dam locality has a convex base that distinguishes it from the Santa Teresa example. Based on this information, the Santa Teresa point can be assumed to have a Late Archaic temporal affiliation.

An obsidian projectile point was collected from Unit 33S/14W (SN 145). This artifact is whole and has the shape of an elongated triangle when viewed in plan view. The blade of this point is as long as the stem. The stem is separated from the blade by a pronounced barb on each margin. The blade margins are straight and have deep serrations along their length. The stem is expanded and the base is strongly convex. There is evidence of grinding on the margins of the stem. The cross section is rhomboidal at the proximal end but changes to a lenticular form at the distal end. Haury (1950: 282, Fig. 60n) illustrates a point very similar to the Santa Teresa artifact. It is possible that the Santa Teresa point may have a late ceramic association, but because local temporal associations are lacking, it is best that this point be left without a temporal assignment.

A projectile point manufactured from a light gray obsidian was collected as an isolated artifact in Unit 51S/01W (SN 431). This whole projectile point is triangular in shape. The blade margins are convex and there are two well-defined side notches present. The base is straight. The cross section is plano convex with the planar face on the ventral side of the original flake blank. This artifact resembles the larger San Pedro variety from Bat Cave as illustrated by Dick (1965: 24, Fig. 20r-u) but differs from these points in being smaller and side notched rather than corner notched. The Santa Teresa artifact is also similar to a type described by Carmichael (1982a: 82, Plate 10f, g) as "Ensor-like" to which he ascribes a Late Archaic-Early Formative affiliation. It is probable, then, that the Santa Teresa projectile point described here can be affiliated with a Late Archaic or early ceramic occupation of the study area.

The blade and a portion of the upper stem of a large serrated projectile point were collected as an isolated artifact in Unit 37S/13W (SN 142). This artifact was manufactured from a brown and tan mottled chert. The blade margins on the point are convex and deeply serrated along their entire length. The cross section is lenticular at the proximal end and rhomboidal at the distal end. Considerable amounts of cortex remain on both faces of the piece. This may be due to the use of a very thin piece of stone with cortex of both faces as the blank or weathering along an incipient fracture in the core from which the flake blank was derived. This artifact is very distinctive in its appearance but no similar forms were illustrated in the literature examined. This point can not be placed with confidence into any temporal period.

One projectile point was recovered from Isolated Manifestation 1 in Unit 36S/14W (SN 147). This point has an elliptical shape in plan view and was manufactured from a fine-fabric banded rhyolite. The blade margins are strongly convex and meet at the distal end to form a sharp tip. There are shallow serrations present on the upper three-quarters of the blade. Two shallow corner notches are located two thirds of the way down the length of the piece. The stem contracts toward the base, which is strongly convex in shape. The cross section is rhomboidal and the body of the point is twisted. This point was produced from a very thin flake that was retouched only along the margins, leaving much of the flake blank morphology and curvature intact. No projectile points that could be compared to the Santa Teresa artifact were observed in the literature. Because of this no temporal affiliation can be suggested.

A fine-fabric rhyolite projectile point was collected in Unit 52S/08W (SN 120). This projectile point is leaf shaped in outline and has a larger crenate fracture along one margin resulting from exposure to considerable heat. The blade margins expand gently toward the base which is slightly convex. The complete margin exhibits slight serrations along three-quarters of the blade length. This artifact bears a vague resemblance to one Type 11 point from Bat Cave (Dick 1965: 26, Fig. 21p) but differs from this type in that the Santa Teresa example has serration and the base is not as convex in form. Type 11 at Bat Cave was found throughout the fill. Haury (1950: 269, Fig.54b) illustrates one point that closely resembles the Santa Teresa point in basic morphology except that the Ventana Cave artifact lacks the serration of the blade margin. These points were found through Papago to Amargosa I strata at this site. The Santa Teresa artifact also resembles some members of both the Catan and Refugio types as illustrated by Suhm and Jelks (1962). However, both of these types are found in portions of Texas far north and east of the El Paso area and the relationship is doubtful. Given the information from Ventana and Bat Cave, it is doubtful that projectile points of the type represented by the Santa Teresa artifact have any temporal sensitivity.

The last projectile point that was recorded as being of an unidentified type was collected as an isolated artifact in Unit 04S/30W (SN 146). This is a basal fragment of a small obsidian projectile point with shallow side notches. The base itself is straight. No good comparisons to this point were found in the literature. Based on its projected size it may have a relatively late temporal affiliation. However, until points of similar form are found in stratigraphic context in the El Paso area, it is best left unassigned to a temporal affiliation.

Culture-Historic Indications of the Projectile Point Collection

Some observations can be offered here as regards the Santa Teresa projectile point collection as a whole. Based upon the presence of only one Folsom projectile point, the Paleo-Indian use of the study area appears to have been limited. This artifact was recovered from a context in which remains attributable to later cultures were also recovered, and it may have been curated. The Early Archaic period is likewise represented in a minor way by the presence of one point fragment of the Jay type.

The presence of two points of the Augustin type, seven Chiricahua Cochise points, seven points of the Pelona type, three artifacts assigned to the Shumla type, and at least two San Jose projectile points suggest a considerable increase in use of the Santa Teresa area during the Middle Archaic. An unknown number of projectile points that could not be assigned a type designation or affiliated with a temporal period may also date to this period.

Many of the points in the Santa Teresa collection, which reflect a variety of types were assigned to types or individually to a broad Late Archaic-early ceramic temporal period following Carmichael (1982a). This is a very long span of time to not be reflected in change in projectile point styles. It is highly probable that with additional excavation in deeply stratified sites in the El Paso area and adjacent regions, some of the forms included in this temporal period will be found to be stylistically shorter lived.

The small number of projectile points (n=2) that can be firmly associated with a late ceramic occupation of the project area is somewhat surprising. This may reflect the greater emphasis on agriculture as opposed to hunting and gathering proposed for these periods. It might also reflect a decreased use of the study area as a favored hunting location or a decrease in hunting concurrent with gathering and processing activities. It is not possible to demonstrate either of these possibliities conclusively with such a small sample.

Based on the types of projectile points recovered during the Santa Teresa survey, populations in the area appear to be most closely allied with cultures to the west. During the Middle Archaic, cultures to the west are represented by one Pinto-like point as well as the several Augustin, Chiricahua, and Pelona types. Influence from the south and southeast may be revealed by the presence of the three Shumla points. In the Late Archaic and early ceramic periods the western influence continues as evidenced by the presence of points of the San Pedro type and a number of points that could not be typed but that seem to have greatest affinities to western types. It is somewhat surprising that there is so little representation of types that have their primary distribution in areas south and southeast of the El Paso area.

Summary

The results of the analysis of 9639 artifacts (64.4%) recovered during the Santa Teresa survey have been presented. In the section concerning raw material resources, it was concluded that the vast majority of, if not all of, the stone material in the collection could be procured locally. A range of materials are available in the gravels of the Camp Rice Formation located just east of the project area. A number of the chert varieties in the collection may have been obtained directly from strata in the Franklin Mountains but unknown quantities of these materials are also undoubtedly available in the Camp Rice gravels. In future surveys in the El Paso area archaeological sampling of the gravels of the Camp Rice Formation and at other locations along the bajada slopes following procedures suggested by Shelley (1980) and Hicks (1985) could yield significant information concerning the availability of favored materials. Of considerable interest would be the quantities of "nonlocal" chert materials (for example, "Laguna Agate") versus local chert materials, as well as the quantity of obsidian, rhyolite, and other favored materials.

The tests of Carmichael's (1982a) Lithic Diversity Index using the Santa Teresa data are instructive. Raw material diversity was shown to be closely tied to the density of artifacts, with diversity increasing in a linearly manner with density. This study also showed that the way in which the material types are grouped has a significant effect on the individual site indices that are used to compute the mean. The tendency for there to be a decreased use of chert through time is somewhat supported by the Santa Teresa data, but the use of the lithic diversity index to quantify this change does not appear to be the best method and may in fact obscure the intensity of utilization of different materials.

Only one of the tests that was performed on the temporal distribution of specific artifact classes revealed a significant difference between time periods. In this test, formal flake tools were found to occur in higher frequencies than expected on Archaic period sites while utilized flakes occurred in higher than expected frequencies on El Paso phase sites. It will be interesting to see whether this difference is confirmed at other sites in the El Paso region.

Chapter 8

RESULTS OF ANALYSIS: CERAMICS

Patricia L. Crown

A total of 3615 sherds were collected within the Santa Teresa survey area. These ceramic fragments were sorted into traditionally defined categories when possible. Ninety-seven (3%) of the sherds could not be classified to a previously defined type, and these sherds were placed in descriptive categories of varying degrees of specificity. Frequencies of sherds for each 100-square-meter transect unit by categories are presented in Table D.1. Each category will be briefly described prior to discussing the frequency of types by site and project chronology.

Typology

El Paso Brown

The category El Paso Brown was used only for those ceramics which were unpainted and definitely not portions of El Paso Bichrome or Polychrome vessels. As much as two-thirds of an individual El Paso painted vessel was actually unpainted, although as a rule the neck and shoulders were. Recovery of an unpainted neck sherd was therefore taken as derived from an unpainted vessel and the sherd classified as El Paso Brown. Sherds from lower portions of vessels, or sherds for which vessel portion could not be determined were classified as "unspecific brown" (following Whalen 1978: 58), a category which probably includes portions of both El Paso Brown and El Paso painted vessels. For this reason, over one-half (55%) of the sherds classified as El Paso Brown were rim sherds. Of these, 71 percent were from jars.

The El Paso Brown from the Santa Teresa Project area is macroscopically identical to that from surrounding areas (Smiley 1977; Whalen 1978; Wiseman 1983). Nonplastic inclusions consisted primarily of profuse coarse feldspar and quartz sand. A single provenience (50S 47W IM-1) yielded a number of sherds which had had some type of organic temper in addition to the sand. This temper had burned out, leaving casts indicative of a fibrous material.

Only four of the El Paso Brown sherds were incised, the remainder exhibited smoothing or polishing.

Rim forms found matched those found previously for El Paso Brown (Whalen 1978; Wiseman 1983; Figs. 8.1 and 8.2). Jars generally had short incurved necks and bowls most often were hemispherical, with flattened rims. A single jar neck exhibited a rim coil that was rolled

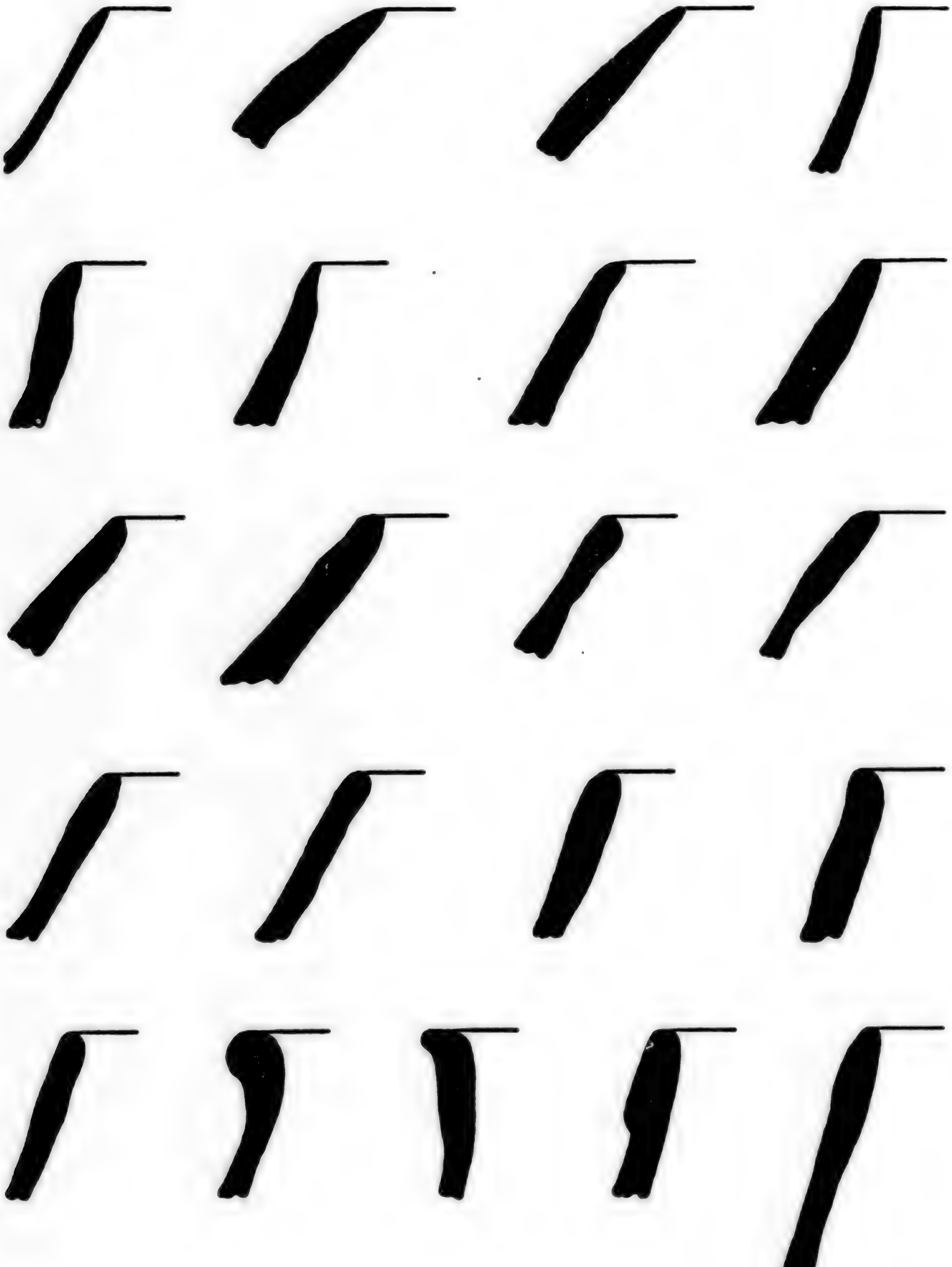

Figure 8.1. El Paso Brown jar rims.

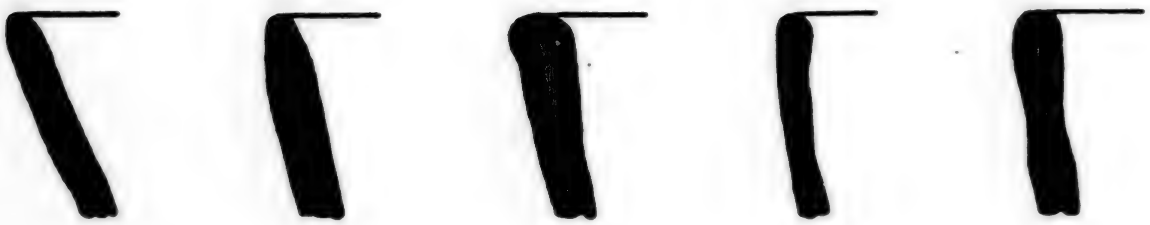

Figure 8.2. El Paso Brown bowl rims.

to the exterior and flattened against this surface (Fig. 8.1). The significance of the rim forms for evaluating temporal placement of sites will be discussed below.

Jornada Brown

Jornada Brown is distinguished from El Paso Brown primarily on the basis of finer surface finish. Jornada Brown sherds exhibit a floated and polished surface. While most of the Jornada Brown sherds in this assemblage had the coarse feldspar and quartz sand inclusions of El Paso Brown, some had finer particles and matrices. Only 76 sherds in the assemblage were classified as Jornada Brown.

Of the sherds recovered, only 3 percent were rim sherds, a quantity which probably more closely approximates the actual rim to body sherd ratio than the high frequency found in the sherds classified as El Paso Brown. The rim forms for the bowl and jar sherds in Figure 8.3 are similar to those found in the El Paso Brown sample.

Unspecific Brown

The vast majority of the assemblage (73%) was classified as unspecific brown. The unspecific brown category includes unpainted portions of El Paso Bichrome and polychrome vessels as well as most body

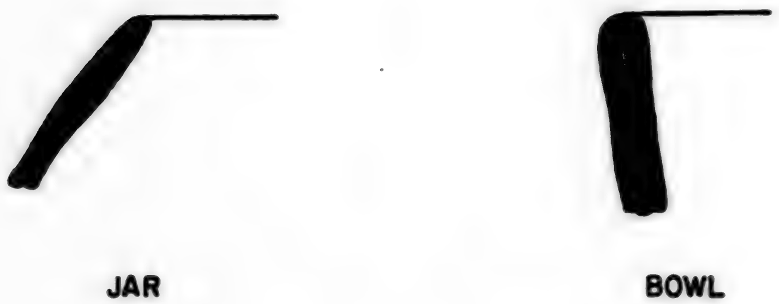

Figure 8.3. Jornada Brown rim forms.

sherds of El Paso Brown. Since the unpainted portions of El Paso Bichrome and polychrome vessels were body sherds also, the unspecific brown category did not include any rim sherds.

The material resembles both El Paso plain and painted types in having abundant coarse quartz and feldspar sand inclusions and smoothed surfaces. Although it was difficult to distinguish vessel forms for these unpainted body sherds, the degree of surface finish on the concave surfaces of the sherds provided a possible indication of whether the sherd was a bowl or jar. The majority of these sherds were classified as jar sherds due to a rough concave surface and lack of evidence for finishing on this surface. Quantification of these data is not provided because it is felt that the observation was highly subjective.

El Paso Corrugated

Three percent (106) of the total assemblage was unslipped corrugated sherds with El Paso Brown paste. Designated El Paso Corrugated, the exterior surfaces of these sherds revealed coils which were widely spaced, indented, flattened, and largely obliterated by wiping.

Red-Slipped Brown

Fifty-three sherds exhibited dark red-slipped surfaces. The paste of these sherds was similar to Jornada Brown (Wiseman 1983: 130). The small size of the sample makes further evaluation impossible.

El Paso Bichrome and Polychrome

El Paso Black-on-brown, El Paso Red-on-brown, and El Paso Polychrome were all present in the assemblage. El Paso Black-on-brown was a great deal more prevalent in this assemblage (8%) than El Paso Red-on-brown (1%) or El Paso Polychrome (2%), and was in fact the second most common type in the collection, after unspecific brown.

These types are characterized by a paste essentially identical to El Paso Brown, with quantities of feldspar and quartz sand inclusions. The paints used are often difficult to see against the dark surface, and it is particularly difficult to distinguish the black paint from fire clouds.

Jars dominate the sample of rims from both bichrome types. Of the seven El Paso Red-on-brown rims, four (57%) are from jars. Forty-four (69%) of the 64 El Paso Black-on-brown rims are jars. The 10 rims of El Paso Polychrome are evenly distributed between bowls and jars. The rim forms found in the assemblage overlap for the three types (Figs. 8.4 through 8.7).

The remaining sherds recovered belong to two categories of types: intrusive and unidentifiable sherds. The identifiable intrusives include types typical of this area of southern New Mexico (Smiley 1977; Whalen 1978; Wiseman 1983): Chupadero Black-on-white; Three Rivers Red-on-Terracotta; Mimbres Boldface and Classic Black-on-whites, and unidentified Mimbres Black-on-white; Playas Red, Playas Red Incised; Gila Polychrome; unidentified Chihuahuan and unidentified Chihuahua Polychrome; and St. Johns Black-on-red. A total of 140 sherds fall into these categories, 4 percent of the total assemblage.

Finally, 95 sherds (3%) could not be identified to type or general area of manufacture. Many of these sherds were small or eroded, making identification difficult. The attempt was made to provide some description of the sherds in the designations assigned these sherds.

Overall, the sample closely matches assemblages from other projects reported in the general area, although there is a lower frequency of Chupadero Black-on-white in the Santa Teresa Project area than in these assemblages from other areas. This is probably due in part to the activities undertaken in the Santa Teresa Project area prehistorically.

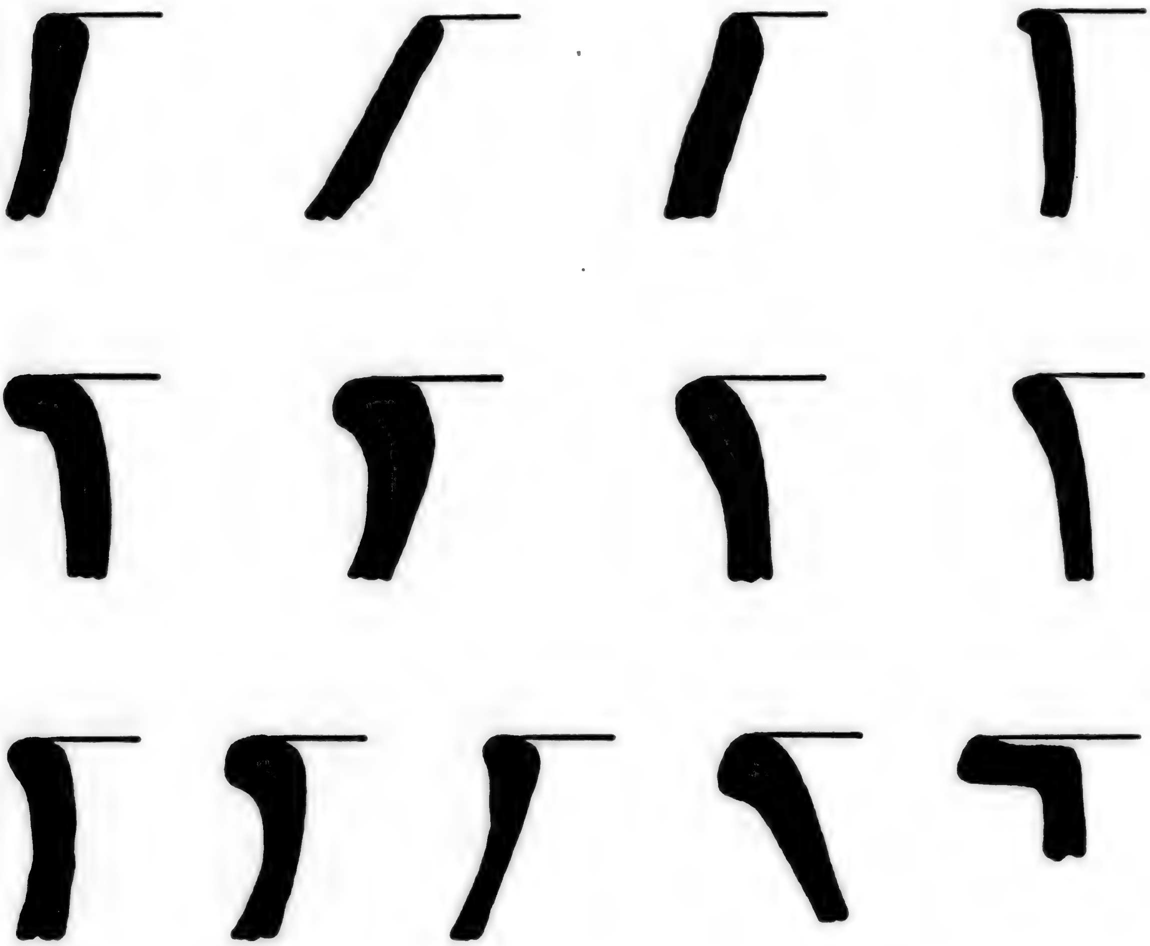

Figure 8.4. El Paso Black-on-Brown jar rims.

Chronology

Dating of ceramic period sites depended largely on temporal placement of associated ceramics. Therefore, every attempt was made to evaluate temporal placement of the sherds found as accurately as possible. Once the sherds had been assigned to types, previously reported dates for these types were used to evaluate period of occupation for the sites. Some of the types, particularly the intrusives, are more accurately and precisely dated than others. Smiley (1977) and Wiseman (1983) provide discussions of dating for the types found and these will not be repeated here, except to provide a general summary of types for each phase.

Ceramics believed to date from the Mesilla phase (A.D. 200 to 1100) include: El Paso Brown, Mimbres Boldface Black-on-white, Mimbres

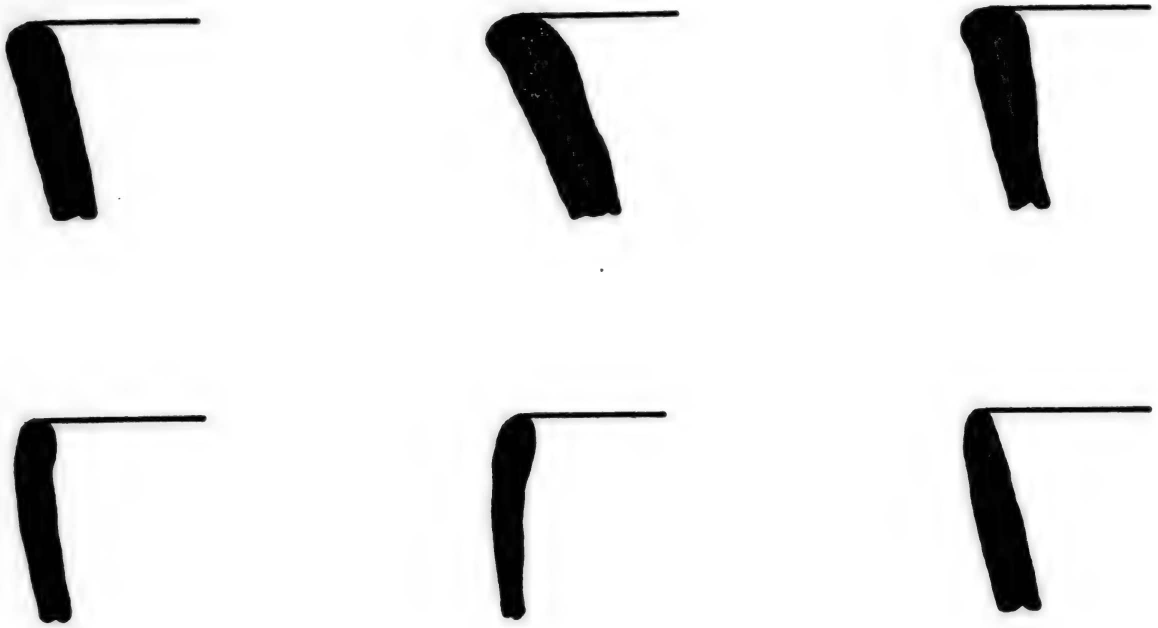

Figure 8.5. El Paso Black-on-Brown bowl rims.

Classic Black-on-white, Mimbres Corrugated, San Francisco Red, and Alma Plain.

In the Dona Ana phase (A.D. 1100 to 1200), indigenous ceramics included El Paso Brown, El Paso Bichrome, El Paso Polychrome, Mimbres Classic Black-on-white, Chupadero Black-on-white, Three Rivers Red-on-terracotta, and St. Johns Polychrome.

Assemblages from El Paso phase sites (A.D. 1200 to 1400) include: El Paso Polychrome, Chupadero Black-on-white, Three Rivers Red-on-terracotta, Lincoln Black-on-red, Gila Polychrome, Agua Fria Glaze-on-red, Heshotauthla Glaze Polychrome, Arenal Glaze Polychrome, St. Johns Polychrome, Ramos Polychrome, Babicora Polychrome, Playas Red Incised, Madera Black-on-white, Galisteo Black-on-white, and Tucson Polychrome.

Following Whalen (1978), the attempt was made to use rim forms of El Paso plain and painted types to refine the chronology for sites with no other datable material. Carmichael (1982a: 64-68) has argued against the validity of this technique. Despite the problems with the technique however, it was felt that a general notion of temporal placement for sites without intrusives might be assessed using rim sherds. To this end, rim profiles were recorded for all sherds of El Paso plain and painted types. Unfortunately, the sample was not adequate to evaluate as many sites as had been hoped. For the defined sites, only 11 had brown ware rim sherds and no datable intrusives. Only 4 of these 11 sites had more than a single rim sherd. Three of

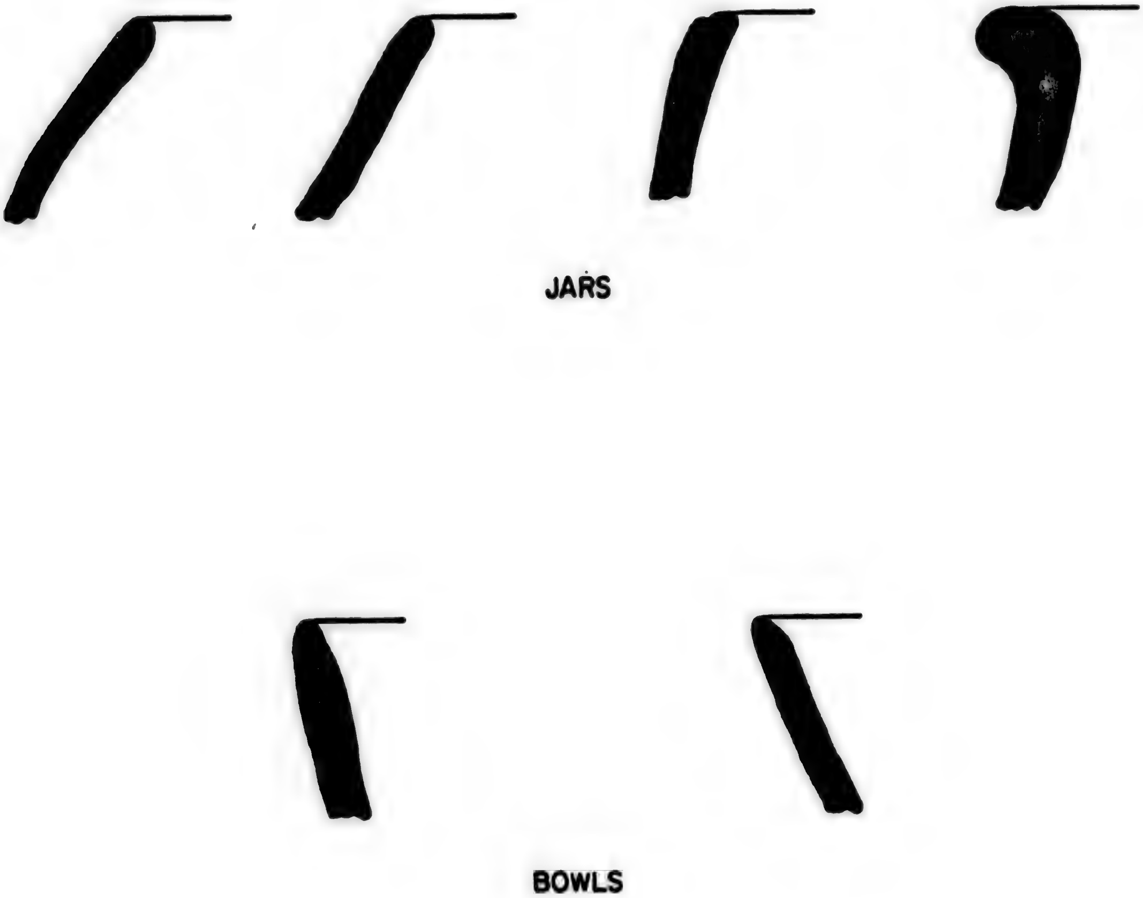

Figure 8.6. El Paso Red-on-Brown bowl and jar rims.

these sites (LA 49339, 49345, and 49365) had "later" rim sherds, while LA 49336 produced one "later" and one "earlier" rim form (Whalen 1978). Overall there appears to have been a trend from incurved, neckless jars to recurved jars with vertical or slightly incurved necks. In the absence of corroborating evidence from better dated types, it is felt that rim forms alone provide a somewhat tenuous means for chronological placement of sites.

Table D.2 provides a listing of types by site for all archaeological manifestations defined as sites. The dating of these sites on the basis of the assemblages is discussed elsewhere.

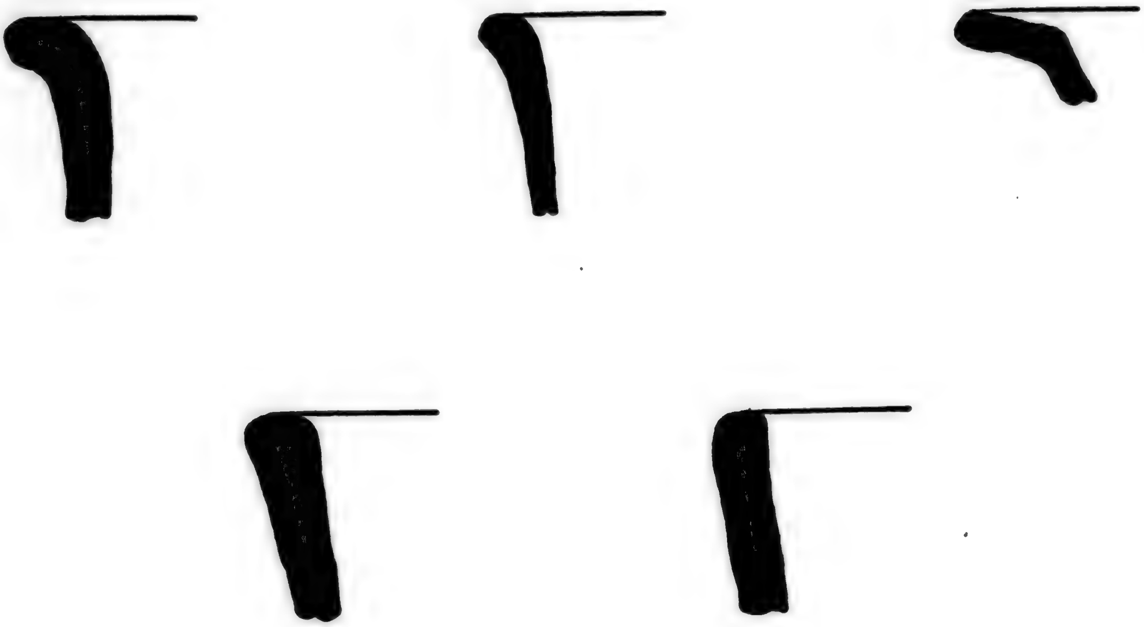

Figure 8.7. El Paso Polychrome rim forms.

Worked Sherds

Fourteen worked sherds were recovered in the assemblage, 0.4 percent of the total assemblage. Typological and provenience information is provided for these sherds in Table 8.1. Over half of the sherds (57%) are El Paso Brown or unspecific brown. The sherds generally have amorphous shapes and a single ground edge, suggesting use as tools for scraping rather than use as spindle whorls.

In conclusion, the assemblage collected within the Santa Teresa Project study area is typical of known assemblages from this area, dominated by brown ware, but with a variety of intrusive types. Although the sherds provide the primary means for dating ceramic period sites, the majority of the sherds recovered are not amenable to temporal placement.

Table 8.1

WORKED SHERDS FROM THE SANTA TERESA PROJECT SURVEY AREA

Type	Count-Form	Provenience
El Paso Brown	1 jar body	47S 9W LA 49368
Unspecific brown	1 jar body	45S 0W IA
	1 jar body	40S 31W IM-2
	1 indeterminate	23S 38W LA 49327
	1 jar body	15S 24W LA 49330, Locus 1
	2 jar sherds	5S 18W LA 49334
	1 jar body	45S 25W LA 49350
El Paso Bichrome Red-on-brown	1 jar body (edge ground)	26S 23W IA
El Paso Bichrome Black-on-brown	1 bowl body	21S 0W
Chupadero Black-on-white	1 jar	5S 27W LA 49353
Unknown Mimbres Black-on-white	1 bowl body	31S 13W LA 49385
Unidentified Red ware	1 jar	43S 31W LA 49329
Unidentified buff paste	1 bowl rim	32S 14W LA 49374

Chapter 9

RESULTS OF ANALYSIS: FLOTATION

Thomas C. O´Laughlin

This chapter presents the analysis of flotation samples taken from 20 hearths located through survey of lands in the Santa Teresa study area in south-central New Mexico. These hearths are identifiable as small, surficial concentrations of burned caliche, and occasionally some rock, with variable amounts of charcoal-stained soil. Macrofloral remains recovered from carbonaceous soil samples of the hearths are interpreted with respect to the past human ecology of the area.

The study area exhibits little topographic relief and is characterized by sheet sands and sand dunes with a few small depressions and with Pleistocene sediments and indurated caliche exposed in deflated or eroded areas. Mesquite (*Prosopis glandulosa*) is the dominant woody shrub of the study area, and stands of soaptree yucca (*Yucca elata*) are noted for much of the survey area. Some creosote bush (*Larrea tridentata*) and broom dalea (*Dalea scoparia*) occur in the northeast portion of the survey area. Broom snakeweed (*Xanthocephalum sarothrae*), a small woody perennial, can be found throughout the area, and four-wing saltbush (*Atriplex canescens*) is often associated with mesquite. Grasses are rare, and herbaceous perennials and annuals are comparatively common, especially with the advent of summer rains.

O´Laughlin (1978, 1980) has summarized available information on changes in climate and vegetation for the region following the late Pleistocene. Evidence suggests that by the middle Holocene, or 8000 years ago, a climate comparable to today´s was established. Hot summers with monsoonal rains and cold and relatively dry winters have been inferred, and summer rainfall is thought to have been greater than at present. Xerophytic species of the Chihuahuan Desert begin to dominate portions of the landscape at this time, but grasslands appear to have been favored in intermontane lowlands. Periods of increased or decreased effective precipitation during the middle and late Holocene and a general drying trend to the present are indicated, and desert shrubs have been inferred. Today´s average annual precipitation is on th[illegible] side of that needed to support desert grassland, and slight changes in precipitation could have resulted in noticeable changes in grass or desert shrub cover. In fact, the combined effects of drought and overgrazing by cattle in the late nineteenth and early twentieth centuries have culminated in the drastic reduction of grass cover and the firm entrenchment of desert shrubs in the region and probably also within the survey area.

There is little doubt that the vegetation of the study area has undergone considerable change in historic times. However, reconstruction of the pristine vegetation is somewhat subjective because of the lack of historic accounts describing the vegetation of this specific area. It can, however, be suggested that grass was probably much more plentiful than at present, that shrubs, leaf succulents, and herbaceous species were fewer in number and more restricted in distribution than at present, and that these conditions were common to the middle and late Holocene. Throughout much of the prehistory of south-central New Mexico and west Texas, intermontane lowlands with a vegetation similar to that of the study area and consisting of desert grassland, desert shrub, or a mixture of the two are believed to have been exploited largely on an intermittent and short-term basis for the procurement of seasonally available foodstuffs (Hard 1983, 1984; O'Laughlin 1978, 1979, 1980; Whalen 1977, 1978, 1980). With respect to potentially edible plant species, the seasons of greatest foraging activity are inferred to be late spring, summer, and early fall when there is also a coincidence of warm temperatures, rainfall, and plant productivity.

Hearths similar to those encountered during the survey of the Santa Teresa study area have been recorded in lowlands and on the lower slopes and alluvial fans of mountain ranges of the region (Hard 1983; O'Laughlin 1979, 1980; Whalen 1977, 1978, 1980). These hearths, particularly those associated with light artifact scatters, have been interpreted as facilities whose functions included the processing of wild plant foods.

Given the above characterization of the plant environment and the possible use of hearths incorporating caliche or rock for processing plant foods, two expectations for plant remains in hearths were posited for evaluation through analysis of the flotation samples taken from hearths found during the survey of the study area. First, fuel to fire the hearths and heat the caliche or rock in them would be comprised of woody shrubs, mostly of mesquite. Second, few carbonized plant parts of subsistence items would be recovered and were anticipated to include potentially edible species currently found in the study area. These would include leaf bases, hearts and flowering stalks of soaptree yucca, which is best processed in the spring and seeds of such plants as mesquite, pig-weed (*Amaranthus* spp.), purslane (*Portulaca* spp.), prairie sunflower (*Helianthus petiolaris*) and grasses such as drop-seed (*Sporobolus* spp.) which mature during the summer and early fall. Previous ethnobotanical studies in the region largely supported these two expectations (Gasser 1983; Holloway 1983; Ford 1977; O'Laughlin 1979, 1980; Wetterstrom 1978, 1980).

Methods

All of the 20 sampled hearths were surface features and had been subjected to differing degrees of wind erosion. Thus, the volume of soil taken from the hearths was dependent upon the extent of weathering of the hearths and the amount of carbonaceous soil remaining in them. Flotation samples varied in volume from 0.3 to 3.0 liters, and 20 percent of the samples were less than 1.0 liters in size (Table 9.1).

Table 9.1

SIZES OF FLOTATION SAMPLES AND PROCESSED FRACTIONS

Site Number	Hearth Number	Sample Size (Liters)	Heavy Fraction (Milliliters)	Light Fraction (Milliliters)
LA 49322	1	1.0	13L*	2L*
LA 49325	1	1.0	19A	10M
LA 49326	1	2.0	11L	14L
LA 49336	1	0.7	19L	2L
LA 49336	5	1.0	20L	1L
LA 49336	6	0.7	16L	4L
LA 49340	3	1.0	131A	54A
LA 49341	1	1.5	103A	49A
LA 49346	1	0.7	12L	4M
LA 49346	2	1.0	2L	3L
LA 49348	1	1.0	11M	7L
LA 49354	2	1.0	16A	21A
LA 49357	1	2.0	56A	43L
LA 49357	2	0.3	2L	3L
LA 49364	1	2.0	34A	45A
LA 49364	2	1.5	42L	10L
LA 49367	1	2.0	18M	8L
LA 49372	1	1.0	13M	16M
LA 49380	1	1.0	20L	12L
LA 49385	1	3.0	50L	14L

* L = Little or none
M = Modest
A = Abundant charcoal

The dry soil from each sample was passed through a 1 mm mesh screen. The larger, heavy fraction left in the screen included large sand grains, small gravel, roots, large seeds, insect parts, and the larger pieces of charcoal. The volume of the heavy fraction was recorded for each sample, as well as the relative amount of charcoal (Table 9.1). All pieces of charcoal greater than 5 mm in size were sorted from the heavy fraction, broken to expose a fresh transverse section, and observed under 10X to 30X magnification for identification. Additionally, all of the remaining material from the heavy fraction was viewed under 7X to 20X magnification, and burned and unburned seeds were extracted for identification. Most of the seeds found in the heavy fraction were large and principally comprised of mesquite, soaptree yucca and spectacle-pod (*Dithyrea wislizeni*).

The light fraction of each soil sample that had passed through the 1 mm mesh screen was further processed by adding water to the soil and pouring the suspended and floating material through polyester fabric with a mesh of approximately 0.3 mm. This process was repeated, and the flotation sample was cleaned of fine soil particles by dipping the folded fabric in clean water. The flotation sample was then dried, and the volume and relative amount of charcoal was recorded for the processed portion of the light fraction (Table 9.1). The processed light fraction comprised small sand grains, insect parts and feces, small seeds, and the smaller pieces of charcoal. The processed light fraction of each sample was completely examined under 7 to 20X magnification, and charred and uncharred seeds were removed for identification.

Wood charcoal and seeds sorted from the heavy and light fractions were identified by comparison with modern comparative material in the El Paso Centennial Museum and the Biology Department of the University of Texas at El Paso. In cases where identification was uncertain but reasonable on morphological grounds, a "cf." was used to indicate the taxon in question.

Results and Discussion

As noted above, the hearths of the Santa Teresa study area from which soil samples were taken for flotation analysis were surface features that had experienced deflation by wind erosion. Given the exposed nature of the hearths, it was expected that preservation of carbonized plant remains would not be particularly good and that they would show disturbance and the introduction of modern contaminants. In fact, 50 percent of the samples contained little or no charcoal, and only 20 percent of the samples had appreciable amounts of charcoal in both the screened, heavy fraction and the floated, light fraction of the same soil sample (Table 9.1). There was no apparent increase in the relative amount of charcoal in the heavy or light fraction of a soil sample with sample size, and this also indicated differential preservation of carbonized plant materials. In addition to the poor preservation of carbonized plant materials and their variable representation from hearth to hearth and independent of sample size, considerable modern disturbance of the hearths was evident from the numerous roots and insect parts and feces found in the soil samples. Furthermore, the introduction of modern contaminants was manifested in the soil samples by the abundance of uncharred seeds which will be discussed shortly.

The deficient preservation of carbonized plant remains was reflected in the few samples that had pieces of charcoal large enough for identification. Only 50 percent of the samples had identifiable charcoal (Table 9.2), and there was no apparent relationship between sample size or volume of the heavy fraction and the number of identified pieces of charcoal in a sample (Tables 9.1 and 9.2). Mesquite charcoal was present in 80 percent of the samples that had identifiable charcoal and constituted 95 percent of the identifiable charcoal (Table 9.2). The only other definitely identifiable charcoal was four-wing salt-bush

Table 9.2

WOOD CHARCOAL RECOVERED FROM FLOTATION SAMPLES

Site Number	Hearth Number	Prosopis Glandulosa (Mesquite)	Atriplex Canescens (Four-wing Saltbush)	cf. Prosopis Small Branches	cf. Prosopis Bark
LA 49322	1	4	-	-	-
LA 49325	1	9	-	-	4
LA 49340	3	51	1	-	-
LA 49341	1	34	6	-	-
LA 49348	1	3	-	-	-
LA 49354	2	9	-	-	-
LA 49357	1	-	-	-	58
LA 49364	1	4	-	-	-
LA 49367	1	-	-	9	14
LA 49372	1	7	-	-	-

which occurred in two samples and made up 5 percent of the identifiable charcoal. Additionally, small branches and pieces of bark that appeared to be burned mesquite were found in three samples.

The predominant occurrence of mesquite charcoal in the soil samples from hearths supports the expectation that mesquite was the fuel most often used to fire them. Mesquite is the dominant woody shrub in the study area today, and four-wing saltbush is a common associate of mesquite. Finding charcoal of these two species in hearths also indicates that they were present in the study area at times when the hearths were in use. Other studies have shown that mesquite was the preferred firewood at lowland sites of the region during the middle and late Holocene, even in areas where mesquite is not particularly abundant today (Ford 1977; Holloway 1983; O'Laughlin 1979, 1980). The distribution of charcoal of other fuels such as four-wing salt-bush generally corresponds to their ecological occurrence today.

In some sites of the region, the possible use of green mesquite as fuel is noted by charcoal with an expanded or exploded cellular structure (Holloway 1983; O'Laughlin 1980). No such pieces of mesquite charcoal were observed in the hearth samples from the Santa Teresa study area, and the very tentative conclusion can be drawn that prehistoric use of the study area was seasonal, intermittent or of low intensity so that there was no lack of dry mesquite firewood.

A wide variety of uncharred seeds were recovered from the soil samples taken from hearths of the study area (Table 9.3). Gasser (1983), O'Laughlin (1980), and Wetterstrom (1978) have dealt with the

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Table 9.3

SEEDS RECOVERED FROM FLOTATION SAMPLES

Site Number	Hearth Number	*Sporobolus* sp. (Drop-seed)	*Yucca elata* (Soaptree yucca)	*Atriplex canescens* (Four-wing Salt-bush)	*Chenopodium/Amaranthus* (Goose-foot/Pig-weed)	*Amaranthus* sp. (pig-weed)	cf. *Corispermum nitidum* (Bug-seed)	*Portulaca* sp. (Purslane)	*Dithyrea wislizeni* (Spectacle-pod)	*Prosopis glandulosa* (Mesquite)	*Trifolium* sp. (Clover)	*Euphorbia* cf. *serpyllifolia* (Spurge)	*Euphorbia* cf. *serrula* (Spurge)	*Zinnia* cf. *grandiflora* (Zinnia)	*Helianthus petiolaris* (Prairie Sun Flower)	*Baileya multiradiata* (Desert Marigold)	Unknown & Unidentifiable
LA 49326	1	-	3	-	-	-	1	1	-	1	-	-	48	-	1	2	2
LA 49336	1	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-
LA 49336	5	-	-	-	-	-	-	1	-	-	-	10	-	-	-	-	-
LA 49336	6	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	(2)
LA 49340	3	-	-	-	-	-	-	-	-	2	1	1	1	-	-	-	-
LA 49341	1	-	1	-	1	-	-	4	-	-	-	2	20	-	-	-	-
LA 49346	2	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
LA 49354	2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
LA 49357	1	-	5	-	(2)*	3	-	1	-	-	-	3	52	-	-	-	(1)
LA 49357	2	-	-	-	-	-	-	-	-	-	-	-	1				
LA 49364	2	-	-	-	1	2	-	10	-	-	-	-	5	-	-	1	-
LA 49367	1	-	-	-	-	-	-	-	181	-	-	-	-	-	-	-	-
LA 49380	1	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-
LA 49385	1	-	-	1	2	2	-	3	-	-	-	6	13	-	-	2	1

* Carbonized seeds noted by parentheses

issue of separating prehistoric seeds from modern contaminants in hearths of the region and have suggested that uncharred seeds are most probably modern contaminants if they are also found in noncultural soils near archaeological sites. Unfortunately, no soil samples were taken for comparative purposes from noncultural settings in the study area. There are, however, two reasons for believing that the uncharred seeds are modern contaminants. First, there is a tendency for the number of unburned seeds to increase with sample size (Tables 9.1 and 9.3). This pattern was not observed for the relative amount of charcoal or the number of identified pieces of charcoal with respect to sample size (Tables 9.1 and 9.2) and indicates that the processes responsible for the deposition of unburned seeds were not the same as those which effect the preservation of charcoal. Second, the constitution of the uncharred seeds (Table 9.3) follows that anticipated for the modern plant environment of the study area. Grasses are rare today in the study area, and only a single uncharred seed of drop-seed (Sporobolus sp.) was found in the hearth samples. Soaptree yucca, a leaf succulent, and mesquite and four-wing salt-bush, woody perrenials, produce relatively few seeds. Although they are common to the study area, these species represent a small portion of the uncharred seeds from hearths. Herbaceous perennials and annuals such as pigweed, purslane and spurge (Euphorbia spp.) are prolific producers of seeds and can be very abundant in the study area with sufficient rainfall. These and other herbaceous species form the bulk of unburned seeds from hearths. Thus, the make up of uncharred seeds from hearths accompanies their suggested production in the contemporary environment and further implies that uncharred seeds are modern contaminants.

Five carbonized seeds were recovered from the hearth samples of the Santa Teresa study area. The small number of charred seeds found in the hearth samples was anticipated and is characteristic of similar hearth sites in lowland settings of the region (Ford 1977; Gasser 1983; O'Laughlin 1979, 1980; Wetterstrom 1978, 1980). The finding of so few burned seeds, as with the small number of identifiable pieces of charcoal, may be an indication of the poor preservation of carbonized plant materials in the exposed hearths. However, there are also alternative explanations. First, the charred seeds may have been deposited as a result of the accidental burning of subsistence items while being processed or of maintenance activities following food consumption. In either case, remains of subsistence items would not be expected to be numerous at hearth sites of the study area where occupation is presumed to have been largely ephemeral and intermittent. Second, the charred seeds may have been burned incidentally to any food processing facilitated by the use of hearths. That is, the seeds may have been burned because of their natural occurrence in soils and in proximity to hearths or because of their inclusion with other plant materials used for tender. Again, burned seeds would be expected to be few in number or variably represented in hearth samples. Unfortunately, the number of burned seeds is insufficient to adequately delimit the processes responsible for their carbonization and deposition in the hearths.

The five charred seeds found in the flotation samples from hearths of the Santa Teresa study area include three unidentifiable fragments of seeds and two seeds of goosefoot-pigweed (chenopodium-Amaranthus), both from the same hearth. Burned seeds of these two genera have been reported from other sites in the region (Ford 1977; O'Laughlin 1980; Wetterstrom 1978, 1980), and the two genera include species which have edible seeds. Pigweed occurs commonly in the study area today, but it is not certain whether goosefoot is part of the modern vegetation of the study area. If the seeds of pigweed and/or goosefoot were burned as a result of a subsistence related activity, then it would be possible to infer a summer or early fall use of the single hearth in which they were found. However, there are too few burned seeds or other edible plant parts in the hearth samples to warrant any conclusion from macrofloral remains as to the role hearths may have played in subsistence related activities within the study area. The presence of two burned seeds of goosefoot-pigweed in one hearth does not provide irrefutable evidence of the use of either of these plants as a food item. At the same time, the absence of carbonized remains of other potential food plants of the study area does not mean that they were not used and processed in conjunction with the use of hearths similar to those sampled within the study area. It could also be that the few carbonized remains of edible plant parts indicate that little food processing was carried out with the use of the sampled hearths. Certainly, many more samples of cultural deposits with carbonized plant remains need to be analyzed for the region as a whole before factors affecting the carbonization, deposition, and preservation of subsistence items will be better understood.

Chapter 10

RESULTS OF ANALYSIS: HISTORIC MATERIAL CULTURE

Marilyn B. Saul

Land-Use Activities

Historic use of the Santa Teresa survey area has been outlined by Stone (Chapter 4) and is summarized below. The major documented land-use activities consist of establishment of the boundary between Mexico and the United States, construction and use of a railway, and ranching. In addition, limited military use of the area may have occurred in conjunction with the military presence in the region as a whole.

U.S.-Mexico Boundary

The initial survey of the U.S.-Mexico boundary was conducted by Major William H. Emory in 1854 and 1855. The boundary was marked with either dressed stones set in mortar or mounds of field stones (Ames 1977: 432). The line was resurveyed by Lieutenant J. W. Barlow in 1892, a project that included refurbishing those markers that had been vandalized or otherwise disturbed. Surveyors' camps and related features likely occurred in the boundary vicinity.

The boundary presently consists of an insubstantial fence. Paralleling the fence on the north is an unmaintained dirt road that allows limited vehicular access to the area. A 3-mile stretch of fence and road delimits the southern boundary of the Santa Teresa survey area. In addition to the standard resource survey transects that terminated at the fence, a 60 m wide transect paralleling the north side of the U.S.-Mexico boundary was intensively surveyed for maximum recovery of historic resources.

No historic artifacts were found that could be directly associated with the establishment of the boundary or subsequent maintenance and patrol. The single boundary-related feature consists of Monument 4, which is a dressed stone marker set in mortar. According to the inscription, this marker is a reestablishment of the marker erected by Emory in the 1850s.

Numerous modern and historic items dating to less than 50 years of age were located in the southeast corner of the project area, east and north of Monument 4. These consisted primarily of dispersed beer bottles and cans, and reflect present-day recreational use of the area correlated to vehicular accessibility. No historic items were found west of Monument 4, at which point boundary road accessibility is severely limited by recent dune formation.

Railway Construction and Use

The El Paso and Southwestern railway route was established in 1900. This line ran roughly parallel to the Mexico-United States border and functioned as a route between Phelps-Dodge Mining Company smelters in Arizona and El Paso until 1924, at which time it was absorbed by the Southern Pacific Railway. The date at which Southern Pacific service was discontinued in the area is unknown, though early communities and sidings associated with the route are mentioned in a 1933 report on Southern Pacific lines between New Orleans and Los Angeles (Darton 1933). A 1-mile portion of this line passes through the survey area.

The abandoned railbed is composed of cinder atop an artificially constructed grade. It is not likely that the soil used to construct the grade was borrowed from the adjacent terrain, as prehistoric sites adjacent to the railbed show no evidence of mechanical disturbance related to such activity. The cinder was likely a by-product of the smelters that the railway was built to service. The railbed has a relatively even grade that does not conform to the topography of the area. In the playa, the bed is approximately 4 m to 6 m above the surrounding terrain, while to the west of the playa, portions of the bed are lower than the surrounding terrain. The historic artifacts located along the route were found primarily on the 30- to 40-degree slopes at the west end of the playa. Lacking depth, these remains represent occasional discard rather than a specific area for trash deposition.

In an attempt to fully identify historic resources associated with the railway, transects parallel to the abandoned railbed were intensively surveyed in addition to the standard survey transects that intersected the bed. These supplemental transects consisted of 50-m wide swathes north and south of the portion of the railway that is in the survey area.

Seventeen of the collected artifacts could be adequately dated and thus directly associated with the presence of the railway. These artifacts are described in detail in the artifact analysis section. Seven glass bottles or bottle fragments dating between 1868 and 1921 were associated with the El Paso and Southwestern Railway phase (1900 to 1924). Three of these bottles had contained beer, two had contained H.H.H. Horse Medicine, and the contents of the remaining two were of indeterminate. The nature of the bottle contents suggests association with railway construction or maintenance rather than railway operation.

Items from the Southern Pacific phase of operation (1924 to 1930s?) consisted of dinnerware that had been produced expressly for Southern Pacific by the Onondaga Pottery Company of Syracuse, New York. These fragments are directly related to the service operation of the railroad.

A track wrench was also collected and may be associated with either or both phases of operation.

Additional historic artifacts were collected from the railbed and included 11 bottles or fragmentary bottles that either postdated the existence of the railway or could not be adequately assigned a date of production and, thus, could not be reliably associated with the railway. Numerous nondiagnostic glass, ironstone, and metal objects (the latter consisting primarily of railroad spikes) were noted but not collected. Such dispersed trash scatter likely occurs along the length of the route and suggests continual use of the area not only during railway operation but subsequent to removal of the tracks and ties. The grade now serves as a road and likely encourages limited recreational use (that is hunting, hiking, and so forth) of the area.

Ranching

Stone (Chapter 4) noted four ranches located outside the survey area. These include Herrington's Home Ranch and Lower Ranch, shown on the 1917 U.S. Geological Survey Quadrangle for this area, and the Norwood Ranch and Braidfoot Ranch, shown on the 1943 U.S. Geological Survey map. The presence of the railway likely facilitated early twentieth-century ranching development in the area.

The grasslands characterizing the survey area were heavily exploited by local ranching concerns, indirectly evidenced by a present-day succession of disturbed soil vegetation. Direct evidence of ranching activities, such as field camps and related historic items, was not identified within the survey area.

Military Use

Military use of the region encompassing the survey area included military posts established between 1851 and 1865 near Las Cruces (Ft. Filmore), in central Grant County (Ft. Cummings), and north of Dona Ana (Ft. Seldon). In addition, temporary military camps were established throughout the region by Gen. John J. Pershing in response to the Mexican Revolution and World War I.

Evidence of extensive military presence in the survey area is absent. No permanent or temporary camps or structures were located. Nonoccupation military use is suggested by 14 cartridge cases and 3 shotgun shells, which were manufactured prior to 1916 (Table 10.1) and, thus, is contemporary with regional military activity. Direct association of these items with military presence, however, is uncertain, because surplus military weapons and ammunition have been commonly used by civilians in the West. Furthermore, cartridge cases are commonly reloaded and survive for some time following manufacture.

Table 10.1

MILITARY CARTRIDGE CASES

Headstamp	Caliber-Gauge	Date	Notes
F 5 88	.45-70	1888	
(none)	.50-70	1866-1880s	Official military use from 1866-1873
US	.32	1869-1936	
UMC .44	.44-40	predates 1911	
FA 9 12	.45	1912	
FA 4 13	.38	1913	Official U. S. Army Revolver caliber from 1892-1911
PC 2 13	.38	1913	Official U.S. Army Revolver caliber from 1892-1911
FA 12 13	.30	1913	
FA 10 14	.45	1914	
FA 4 15	.30	1915	
Winchester Rival	12	1870s-1900s	
UMC New Club	12	prior to 1910	
WRA Leader 1901	16	1901	

Summary

The spatial distribution of all collected and noncollected historic items was plotted in order to examine historic land-use patterns and is presented in Figure 10.1. Three major areas of distribution are noted: along the abandoned railbed, between the railbed and the currently operational Southern Pacific Line to the north, and in the southeast corner of the survey area. These areas reflect continued use corresponding to area accessibility.

The ephemeral nature of the historic resources encountered made it impossible to address specific research questions posed by Stone (this volume). In general, resource exploitation of the survey area was limited to livestock grazing and occasional wildlife procurement. The

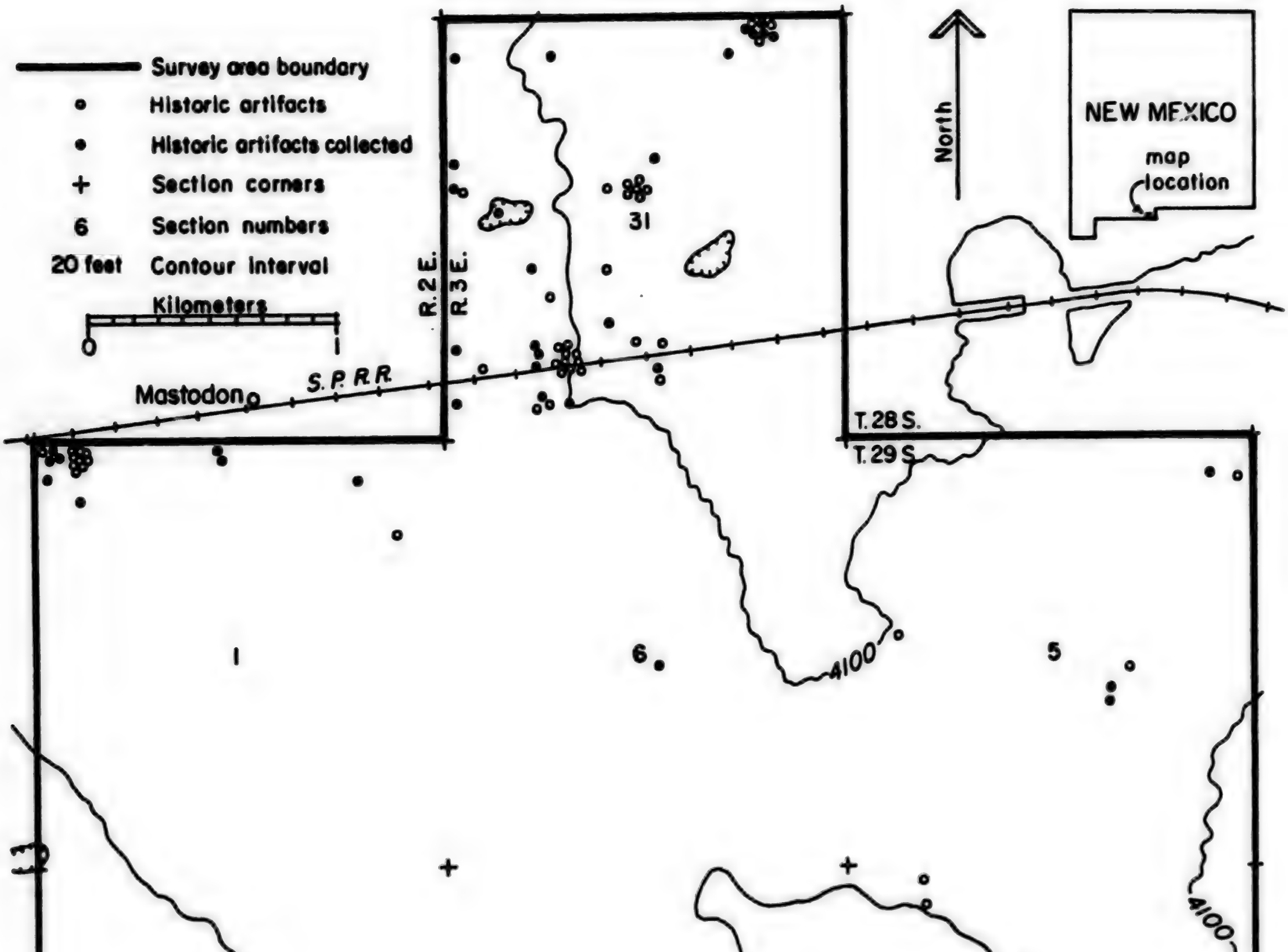

Figure 10.1. Distribution of historic artifacts within the project area.

area was not conducive to historic occupation but rather served as a transit route, primarily for the railroad but also for Mexican emigrants coming north. The abandoned railbed continues to supply access to the northern portion of the survey area while border roads supply access to the southeast. Utilization of the area has shifted from through-transit (with the exception of immigrants) to recreational utilization, specifically off-road vehicles.

The remainder of this chapter briefly describes by individual classes the historic resources that were collected. Seventy-seven whole or partial diagnostic historic artifacts representing four artifact classes were collected. Nondiagnostic historic artifacts and those determined in-field to be less than 50 years of age were mapped on the individual transect forms but not collected. The four artifact classes consisted of glass, ceramics, ammunition, and other metal objects.

Historic Artifacts

Glass

A minimum of 28 whole or fragmentary bottles were collected. Thirty-seven percent of these had contained beverages, primarily beer. Eleven percent were proprietary medicine containers, 15 percent contained "Battery Oil," 4 percent were household or personal bottles, and 33 percent had undetermined contents. Table 10.2 presents the frequency distribution of glass colors by bottle type.

Flint refers to clear glass, which was produced from 1880 to 1915 by adding manganese to the glass mixture (Munsey 1970: 55). When exposed to ultra-violet light, glass containing manganese turns purple.

Table 10.2

DISTRIBUTION OF GLASS COLORS BY BOTTLE TYPE

Color	Number	Containment Category
Flint (clear)	9	Oil; personal; undetermined
Sun-colored amethyst (SCA)	5	Beverage, undetermined
Light blue (aqua)	1	Beverage
Light green	5	Beverage; medicine; undetermined
Medium green	1	Beverage
Dark brown	5	Beverage; undetermined
"Black"	1	Beverage
White (opal)	1	Proprietary medicine

Glass producers turned to selenium as a decolorizing agent when World War I curtailed the importation of manganese into the states from Germany (Munsey 1970: 55). Thus, sun-colored amethyst glass likely dates to pre-1915. As the glass collected during the Santa Teresa Project was from the surface, and thus had been exposed for some time to ultra-violet light, recovered flint glass most likely postdates the use of manganese as a decolorizer.

Blue (aqua) and green are the most common bottle glass colors. They result from the iron content in the raw material (Munsey 1970: 37), and represent the cheapest manufacturing technique because no extra expense was incurred in an attempt to alter the natural color of the glass. Most bottles made at the turn of the century are of these colors; due to production of natural-colored glass over a long period of time, green-aqua bottles are not datable on the basis of color.

Brown (amber) colored glass is the result of the addition of carbon or nickel to the glass mixture. This color of glass was desirable for products affected by light (Whitall, Tatum and Co., 1971: 28) and was preferred after the introduction of pasteurization in 1873, which had resulted in a burgeoning brewery subindustry (Wilson 1981: 1, 2). The continuing popularity of brown glass hinders precise dating of bottles on the basis of color.

"Black" glass is made by adding iron slag to the mixture and was popular until approximately the mid-1800s (Munsey 1970: 37). Its continuous though reduced production to date does not allow for precise dating.

White (opal) glass is formed by the addition of tin or zinc to the process. Whitall, Tatum and Co. (1971) offered opal glass containers as early as 1880. Opal-colored bottles are still being produced today.

Production

Three methods of bottle production are possible: free-blown, mold-blown, and machine-made. No free-blown bottles were found on the Santa Teresa Project. Mold-blown bottles were represented by nine whole or partial bottles. Seven machine-made bottles were collected and the remaining 11 fragments were of indeterminate production.

Mold-Blown Bottles

A variety of molds were used for mold-blown bottles, a method of production that fell into disuse in the bottle industry with the advent of the automatic bottle-making machine in the early 1900s (Munsey 1970: 32).

A single turn-molded bottle base of "black" glass was collected. This bottle fragment also exhibited a mold-formed push-up, a feature noted by Liesenbein and Fratt (n.d.: 2) to occur only in turn-molded bottles. According to Tolouse (1969: 532) use of the turn-mold became popular in the 1870s and it continued to be used possibly as late as the 1910 to 1920s.

Six mold-blown bottles were represented only by the necks and finishes, all of which lacked side seams continuing to the finish. The absence of seams was due to deliberate rubbing out of the seams after the bottle was removed from the mold (Tolouse 1969: 533). These bottles also exhibited hand-tooled finishes.

The remaining two mold blown bottles exhibited a post-bottom mold seam and a cup-post-bottom seam. Post-bottom mold seams consist of a circular seam centered on the bottle bottom from which the side seams radiate, while cup-bottom seams are characterized by a seam around the heel from which side-seams radiate. Post-bottom mold seams occur primarily with mold-blown bottles; cup-bottom molds are more commonly associated with machine-produced bottles (Tolouse 1969: 581-583). A combination of both post- and cup-bottom mold seams (cup-post-bottom mold) was noted by Liesenbein and Fratt (n.d.: 2) in a sample of bottles from the Tucson Urban Renewal Project. Only 1 of the 247 bottles featuring this combination was machine-made, leading the authors to conclude that this combination was a popular base mold in mold-blown bottles (Liesenbein and Fratt n.d.: 2).

Machine-Made Bottles

Michael J. Owens was responsible for introducing mechanization into the bottle industry with his invention of the semiautomatic bottle-making machine, patented in 1891. He followed this with the fully automatic machine in 1903. By 1914, there were 172 of Owen's machines in operation (Munsey 1970: 33).

Among the characteristics of machine-made bottles are irregular, feathery, nonsymmetrical bottom seams (suction cut-off scar), one or more seams circling the top of the finish, and faint, irregular lines appearing alongside and crossing the side or bottom seams ("ghost seams"; Tolouse 1969: 586-587).

Of the seven machine-made bottles collected on the Santa Teresa Project, six exhibited suction cut-off scars, which date them to no earlier than 1904, when the first suction machine was developed (Tolouse 1969: 582). Two of these exhibited post-bottom molds and four were formed in a cup-bottom mold. Top finish seams and "ghost seams" appeared on four of the bottles. The two remaining bottles were represented only by bases.

The seventh machine-made bottle in the collection did not exhibit a suction cut-off scar, indicating it could have been produced on either a semiautomatic or automatic machine. However, the presence of a continuous-thread finish suggests this bottle was produced after 1924 on an automatic bottle-making machine. "Ghost seams" and top finish seams were present on this cup-bottom molded bottle.

Finishes

Finish refers to the production of the aperture of a bottle, the final process in bottle production, and reflects the type of closure used. Corks were popular closures for handblown bottles because of the difficulty in finishing the apertures to accommodate a screw cap (Lief n.d.: 9).

In the Santa Teresa Project collection, five cork-closure finishes were hand-tooled onto mold-blown bottles. Four of these bottles were beer containers, two of which were dark brown, one light green, and one sun-colored amethyst. The fifth hand-tooled finish was from a light green patent extract bottle. Two additional cork-closure finish bottles were machine-made, and consisted of a light green packing bottle of unknown contents, and a flint battery oil bottle.

The cork-closed beer bottles probably date to before the first decade of the twentieth century, after which time semiautomatic and automatic bottle-making machines introduced standardization in bottle manufacturing, thus facilitating use of the crown cap closure. The patent extract bottle also dates to this period, based on the company production dates of 1868 to about 1898 (Wilson and Wilson 1971: 43). The packing bottle is post-1909, based on the production company origination date of 1909 (Fontana, 1968: 45-55), and the battery oil bottle is undated.

Crown cap closures were first developed in 1889 and patented in 1892 (Lief, n.d.: 17). Bottle-making standardization, with the advent of the semiautomatic, bottle-making machine invented by Owens in 1891, made crown closures feasible, and by 1912, adoption of this closure type was wide-spread (Munsey 1970: 33, 105). A single example of crown closure was collected and consisted of a brown glass, 8-ounce 7-UP bottle. The 7-UP corporation became a viable enterprise in the 1930s (Munsey 1970: 105), and this bottle likely is of a much more recent vintage.

Continuous thread closure specifications were standardized in the bottle industry soon after 1924 (Lief, n.d.: 27). The single continuous-thread, closed bottle collected on the Santa Teresa Project was manufactured in Mexico and is of an unknown date.

Maker Marks

Maker marks appear on the base or heel (just above the curve of the base) and refer to the firm that manufactured the bottle. User marks are found on the sides or base of bottles and indicate the company for which the bottle was made.

Nine maker marks were noted in the Santa Teresa Project sample, five of which could be identified as to firm (Fig. 10.2).

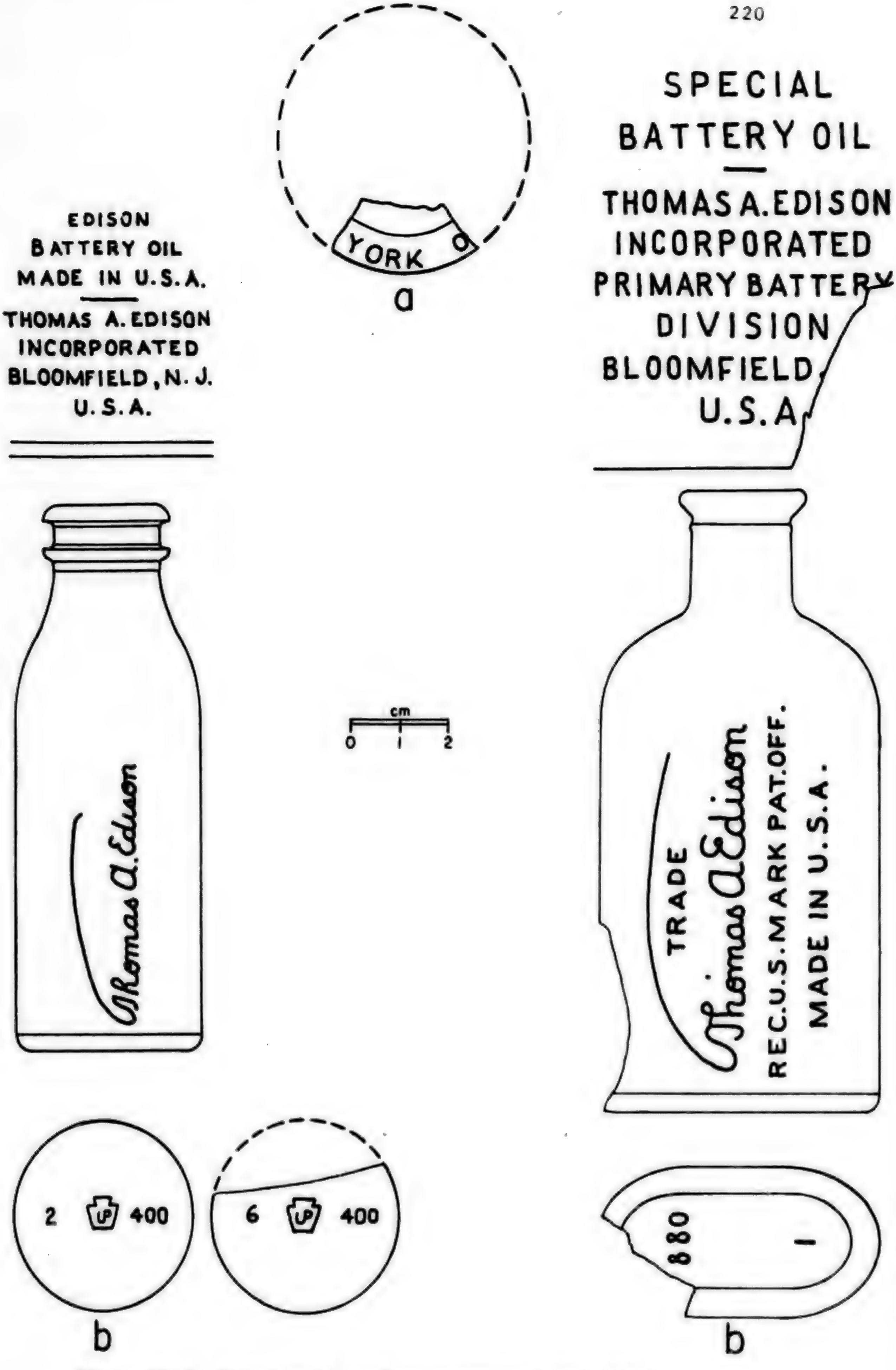

Figure 10. 2. Maker marks with accompanying user marks.

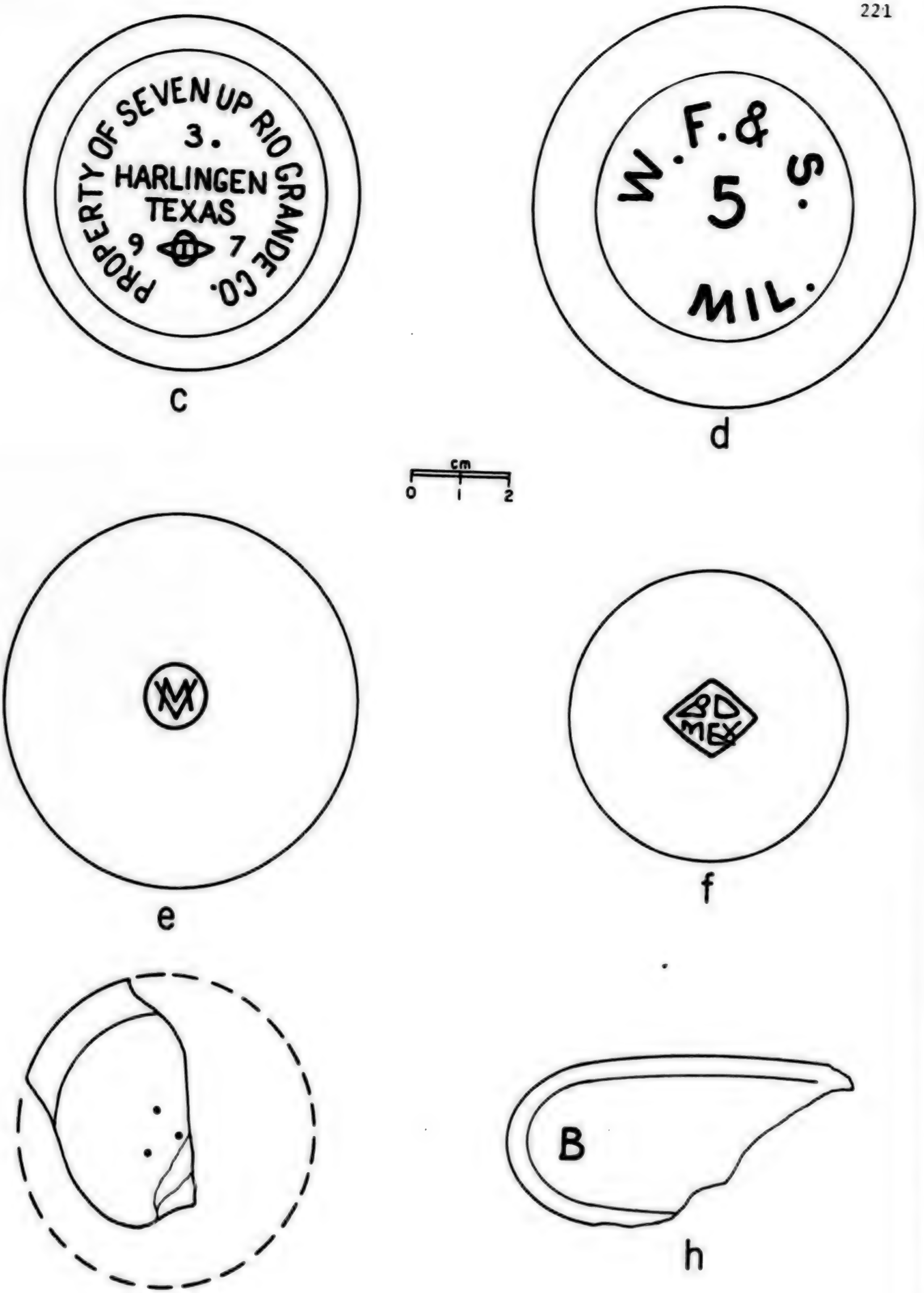

Figure 10.2. Continued.

Chesebrough Manufacturing Company (1887-?)

Vaseline jar; white (opal) glass (Fig. 10.2a). This product was introduced in 1859 (Jones 1963: 13). Robert A. Chesebrough inherited the firm in 1872 and began commercial sale of the product by 1887 (Wilson and Wilson 1971: 110). Flint and amber vaseline bottles appear to have been the more popular glass types prior to the turn of the century (Wilson and Wilson 1971: 28; Wilson 1981: 44). The date at which opal glass containers were introduced is unknown.

Lummis Glass Company (1940-1955)

Lummis became the exclusive distributor for the Pennsylvania Glass Company, an affiliate of Knox Glass Bottle Company (Tolouse 1971: 335). The firm was commissioned by Thomas A. Edison Incorporated to produce at least one variety of bottle for their battery oil product, of which two bottles were collected. The maker mark on the remaining bottle type for this product is unknown (Fig. 10.2b).

Owens-Illinois Glass Company (1929-present)

The 7-Up Rio Grande bottling company probably obtained this container from the Streator, Illinois Plant (No. 9) which was in operation from 1930 through at least 1970 (Tolouse 1971: 395). Although the number to the right of the maker mark was to indicate the year of production (Fig. 10.2c), given the plant operation dates and institution of the 7-UP corporation in the 1930s (Munsey 1970: 105), it is more likely that the heel mark on this bottle (C5266) represents the date of production (May 2, 1966?).

William Franzen and Son (1900-1921)

Two beer bottle bases bear this maker's mark (Fig. 10.2d). Milwaukee brewers are credited with being the most important customers of this firm which folded in 1921 due to prohibition (Tolouse 1971: 536).

Vidreira de Monterrey (1909-1968+?)

Vidreira de Monterrey (Fig. 10.2e) was Mexico's first industrially important manufacturer of glass containers (Fontana 1968: 48). The contents of the single VM bottle found on the Santa Teresa Project are unknown, though the bottle is beer shaped according to the bottle shape typology established by Herskovitz (1978: 4). The bottle exhibits a "packing" type finish (Herskovitz 1978: 5). The VM liquor bottle found at Magdalena de Kino had a double-threaded finish while the beer bottle finishes from the same area were not noted (Fontana 1968: 51-52). The production of the Santa Teresa specimen likely predates the use of continuous-thread closures, placing this bottle in a period from 1909 to 1924.

Illinois Pacific Coast Co. (1930-1932)

A single flint bottle base was collected bearing this maker's mark. The bottle contents were undetermined.

The remaining three unidentified maker marks are represented in Figure 10.2f-h.

User Marks

In addition to the user marks previously mentioned in conjunction with maker marks, five user marks were noted on body fragments (Fig. 10.3). Only one of these was complete enough to be identified to a firm (Fig. 10.3b).

The H.H.H. patent-medicine bottle contained horse medicine developed by Daniel Dodge Tomlinson and trademarked in 1868. He sold his rights to Henry R. Moore who eventually retired in 1898 (Wilson and Wilson 1971: 119-120).

Summary

Relative dates were established for the production of 25 of the 27 whole or partial bottles collected on the Santa Teresa Project (Table 10.3). When possible, dates were based on maker and user marks. In the absence of such criteria, the production method (nonmachine or machine-made), presence or absence of manganese as a decolorizing agent, and type of finish were used to formulate probable dates of production.

Ceramics

The majority of the fragmentary ceramic vessels collected (82%, n=9) were ironstone dinnerware directly associated with the Southern Pacific Railway line that passed through the project area from 1924 to the 1930s or 1940s (Stone, this volume). All of these vessels were manufactured by the Onondaga Pottery Company in Syracuse, New York, established in 1871 (Kovel and Kovel 1953: 99).

Three variations of the Onondaga basemark (Fig. 10.4) were noted, although dates during which these specific basemarks were used could not be established. However, both basemarks a and b are stylistically older than basemark c, and the fragments on which basemarks a and b occur appear to have undergone more weathering than fragments bearing basemark c.

Three design patterns were present. Pattern A consisted of a faded green and white floral border edged by a single green band. Pattern B is a pink lily and yellow primrose(?) display within a black border. Design pattern appears to be directly associated with the type of basemark used (Table 10.4).

Table 10.3

SUMMARY OF BOTTLES COLLECTED ON THE SANTA TERESA PROJECT AND THE PROBABLE DATES OF MANUFACTURE

Contents	Maker/User	Shape	Finish	Color	Date	Based on:
Horse Medicine	unknown/H.H.H.	panel	patent/extract	light green	1868-1898	date of retail sales
Horse Medicine	unknown/H.H.H.	panel	patent/extract	light green	1868-1898	date of retail sales
Beer	unknown/unknown	beer	unknown	"black"	1870-(1910-1920)	dates of turn mold production
Vaseline	unknown/Chesebrough	pomade	unknown	opal	1878-(post 1900?)	dates of earliest retail sales
Beer?	Vidreira de Monterrey/unknown	beer	packing	light green	1909-1924	date of plant opening; pre-screw top finish
Beer	unknown/unknown	beer	brandy	SCA	1800-1915	period in which manganese used as decolorizing agent
					(possibly pre-1903)	hand-tooled finish, mold-blown
Unknown	unknown/unknown	French square	unknown	SCA	1880-1915	period in which manganese used as decolorizing agent
Unknown	unknown/NEW...NELSON CO...	unknown	unknown	SCA	1880-1915	period in which manganese used as decolorizing agent
Unknown	unknown/BROWN...LOUIS...	unknown	unknown	SCA	1880-1915	period in which manganese used as decolorizing agent
Beer	Wm. Franzen and Son/unknown	beer	unknown	dark brown	1900-(1903-1921)	company date; mold-blown; hand-tooled
Beer	Wm. Franzen and Son/unknown	beer	unknown	light blue	1900-(1903-1921)	company date; mold-blown; hand-tooled
Beer	unknown/unknown	beer	beer	dark brown	pre-(1920-1933) possibly pre-1903	change in finish style occurred post-prohibition in conjunction with machine production hand-tooled finish; mold-blown
Beer	unknown/unknown	beer	beer	dark brown	pre-(1920-1933) possibly pre-1903	change in finish style occurred post-prohibition in conjunction with machine production hand-tooled finish; mold-blown
Beer	unknown/unknown	beer	beer	medium green	pre-(1920-1933) possibly pre-1903	change in finish style occurred post-prohibition in conjunction with machine production hand-tooled finish; mold-blown
Toiletry	unknown/unknown	fluted prescription	unknown	flint	post-1915	period after which manganese no longer used as a decolorizing agent
Battery oil	unknown/Thomas A. Edison Inc.	plain oval	prescription	flint	post-1915	period after which manganese no longer used as a decolorizing agent

Table 10.1 continued

Contents	Maker/User	Shape	Finish	Color	Date	Based on:
Unknown	unknown/unknown	plain oval	unknown	flint	post-1915	period after which manganese no longer used as a decolorizing agent
Unknown	unknown/unknown	unknown	unknown	flint	post-1915	period after which manganese no longer used as a decolorizing agent
Unknown	unknown/unknown	unknown	unknown	flint	post-1915	period after which manganese no longer used as a decolorizing agent
Unknown	unknown/unknown	unknown	unknown	flint	post-1915	period after which manganese no longer used as a decolorizing agent
Beer?	BD Mex/unknown	beer	screw	light green	post-1924	based on earliest machine production of continuous thread (screw) finish
Carbonated beverage	Owen-Ill. Glass Co./7-Up	abbreviated beer	crown	dark brown	post-1930 probably 1966	7-Up corporation began in 1930; inferring 1966 from heel mark
Unknown	Illinois Pacific Coast Co.	unknown	unknown	flint	1930-1932 - operation dates	C5266 (May 2, 1966)
Battery oil	Lumis Glass Co./ Thomas A. Edison Inc.	vial	unknown	flint	1940-1955	Lummis Glass Co. operation dates
Battery oil	Lummis Glass Co./ Thomas A. Edison Inc.	vial	bead	flint	1940-1955	Lummis Glass Co. operation dates
Battery oil	Lummis Glass Co./ Thomas A. Edison Inc.	vial	unknown	flint	1940-1955	Lummis Glass Co. operation dates
Unknown	unknown/unknown	unknown	unknown	light green	unknown	--
Unknown	unknown/unknown	unknown	unknown	dark brown	unknown	--

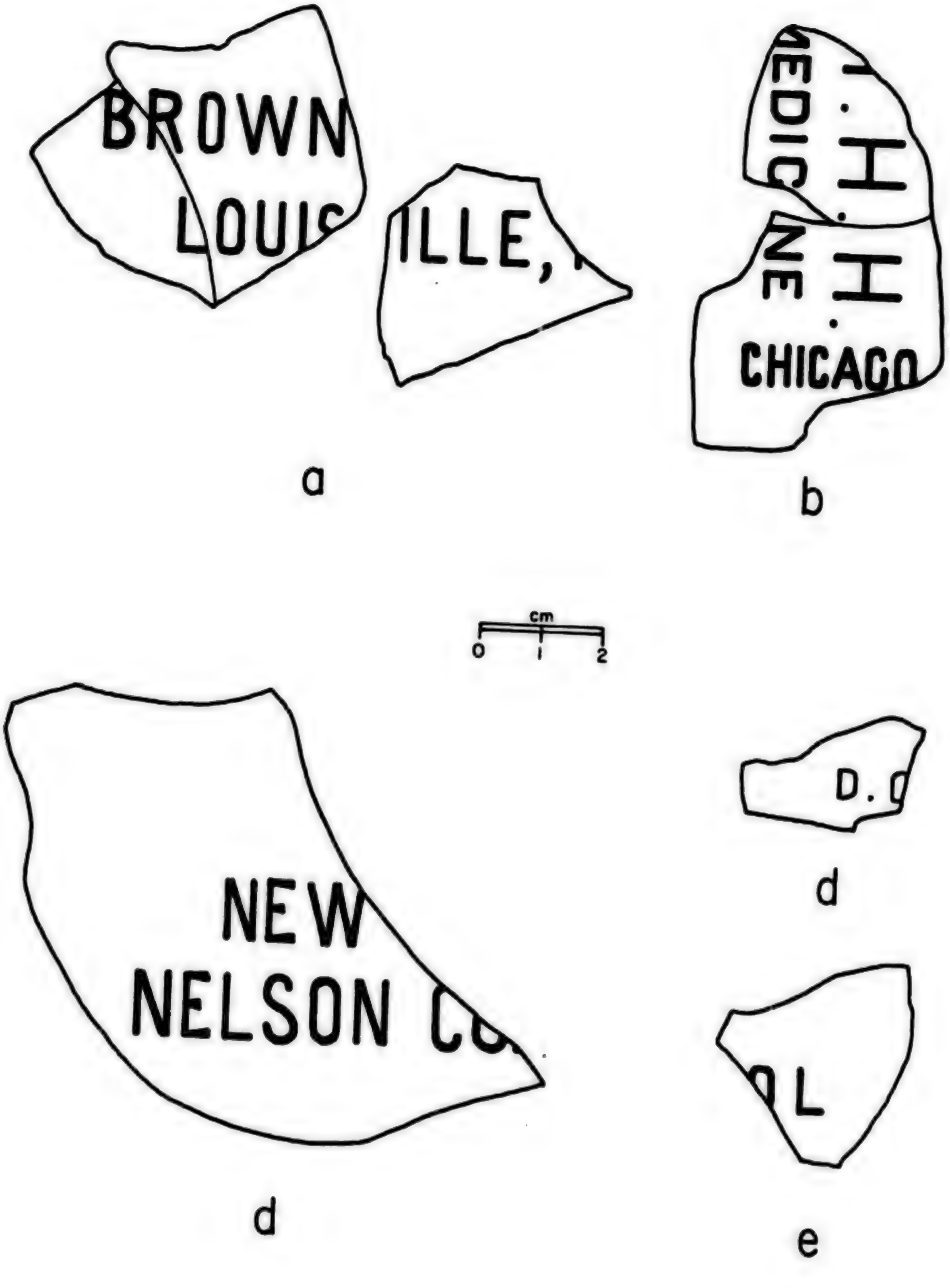

Figure 10.3. User marks.

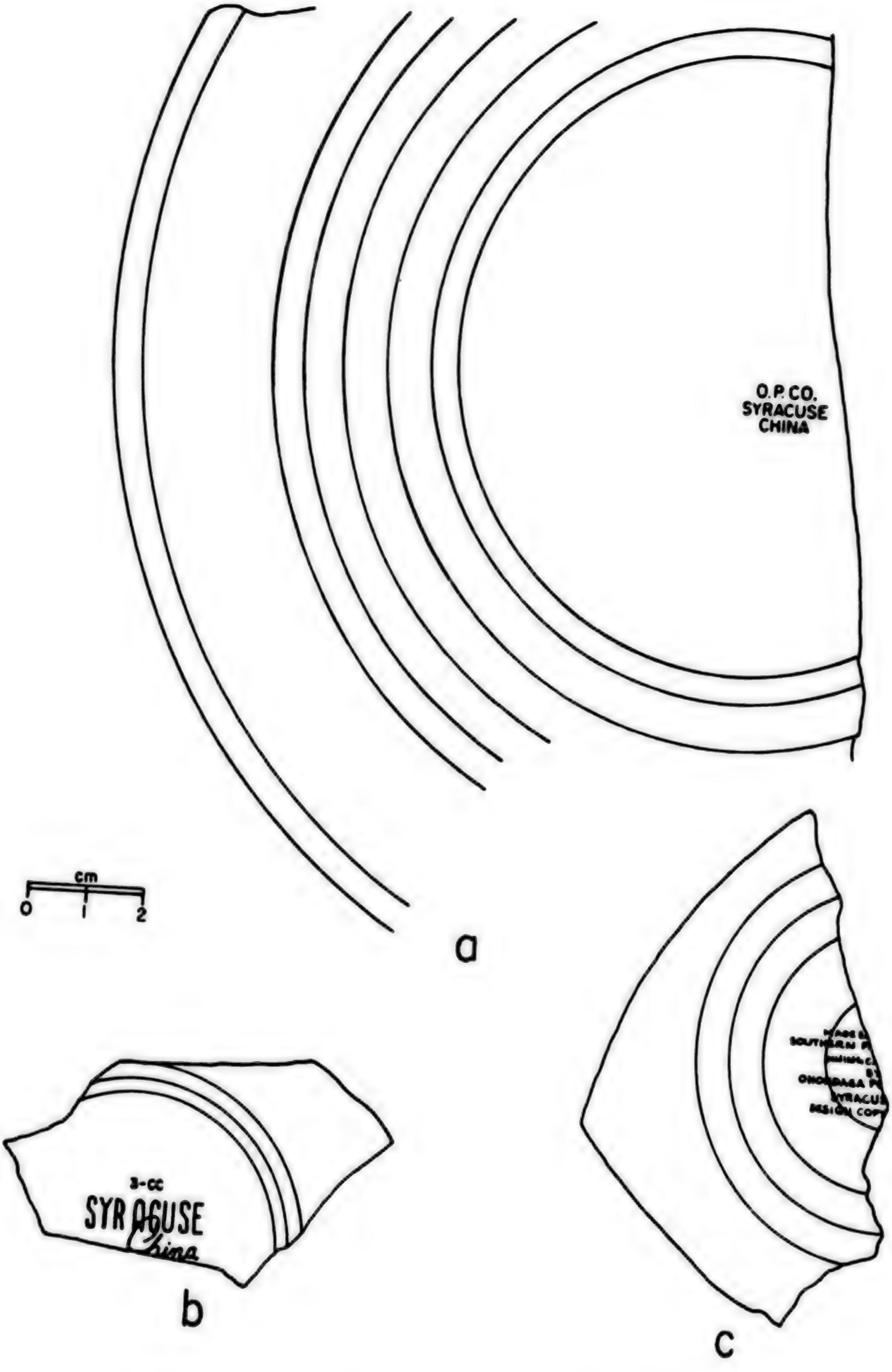

Figure 10.4. Variations of the Onondaga basemark.

Table 10.4

BASEMARKS AND DESIGN PATTERNS

Vessel Type	Basemark	Design Pattern	Design Placement
Plate	a	A	Interior
Cup	?	A	Exterior
Cup	b	?	?
Cup	b	?	?
Cup	c	B	Exterior
Saucer	c	B	Interior
Saucer	?	B	Interior
Plate	c	B	Interior
Bowl	c	C	Interior

The remaining fragmentary ceramic vessels collected in the project area appear to have been manufactured in Mexico. Fragments of a crudely made, hole-mouthed jar were collected. The jar exhibited a footed ring-support and untempered, buff ware paste. The precise shape of the vessel could not be determined. It appears to have been formed on a wheel and exhibits exterior tool-finishing striations in both vertical and horizontal directions. The body was distorted upon removal from the wheel, and finger smudges occur where it had been handled prior to drying. Red paint was thinly applied to the vessel partway up the vessel sides.

The aperture of a crockery jug was collected. The exterior exhibited a buff glaze and the interior had been glazed dark brown.

Fragments of at least one, possibly two, cups were found in adjacent transect units. The thin, untempered fragments exhibited a green transparent glaze both externally and internally. The external design consisted of dark-brown leaves above a thin dark-brown and burnt sienna horizontal line, presumably circling the vessel. Below this line is a raised floral design beneath which is a broad, horizontal burned-sienna line. The raised design and the absence of tool-finishing marks suggest this vessel was made in a mold. A dark green glazed ceramic plate fragment, similar in design, was also collected.

Ammunition

Twenty-four cartridge cases, 7 shotgun shells, and 2 bullets were collected on the Santa Teresa Project.

Cartridges

The caliber and headstamps of the collected cartridge cases are illustrated in Figure 10.5.

.25 Caliber (Fig. 10.5a)

Two .25-35 caliber Winchester cartridge cases were collected. This caliber is listed as a current American rifle cartridge case by Barnes (1965: 21).

.30 Caliber (Fig. 10.5b)

This caliber was initially manufactured at the Frankford Arsenal in October 1906 with final production of the Model 1906 on June 22, 1921. Minor changes were made to adapt the cartridge case to the MI bullet (Hackley 1967: 191). Two of the six .30 caliber cartridge cases date to the earlier Model 1906 production and bear the headstamp dates of December 1913 and April 1915. The remaining four cartridge cases represent the modified MI version and are headstamp-dated 1928 and 1929. All collected cartridge cases of this caliber were manufactured at the Frankford Arsenal.

.32 Caliber (Fig. 10.5c)

Two Winchester .32-20 WCF cases were identified. This semiobsolete cartridge case was first introduced by Winchester in 1882 for the Model 73 lever-action rifle (Barnes 1965: 46).

Three U.S. .32 rim-fire cartridge cases were also identified.

.38 Caliber (Fig. 10.5d)

Three .38 Long Colt cartridge cases were located. All had been manufactured in 1913, one by Peters Cartridge Company in February and two by Frankford Arsenal in April. This caliber was introduced in 1875 and was the official U.S. Army revolver from 1892 to 1911 (Barnes 1965: 162). The Ordnance Department contracted production of the .38 caliber to Peters Cartridge Company (among others) for a period extending from 1909 to 1913. Frankford Arsenal ceased production of this caliber in 1915 (Hackley 1967: 5).

.44 Caliber (Fig. 10.5e)

A single UMC .44-40 CFW cartridge case was collected. Barnes (1965: 6) states that this caliber originated in 1873 and, although no longer used in rifles, enjoys a limited popularity in the revolver. The specimen from the Santa Teresa Project predates 1911, at which time

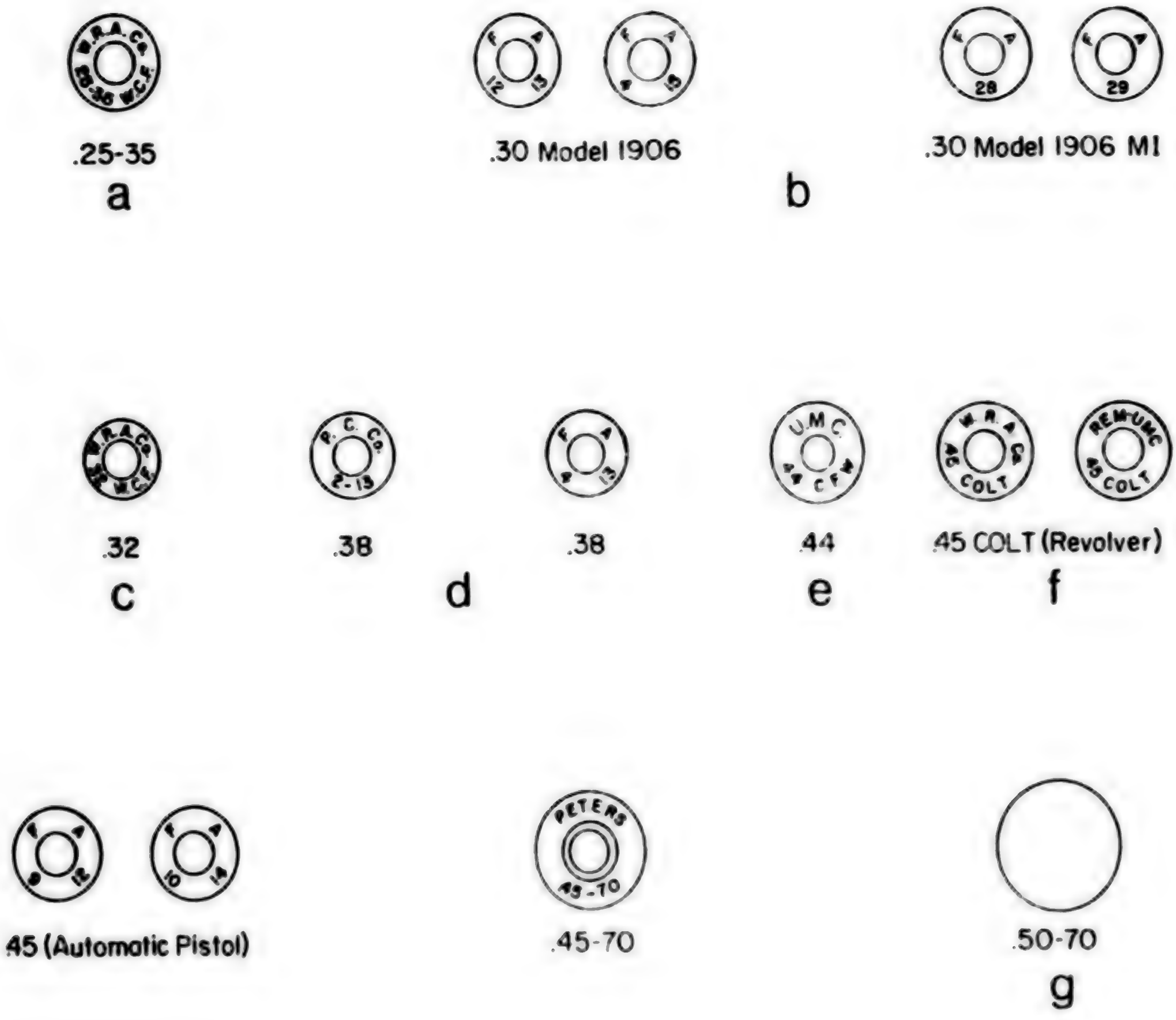

Figure 10.5. Caliber and headstamps.

Union Metallic Cartridge Company and Remington Arms Company (which had merged in 1888) changed headstamps to read REM-UMC (Hackley 1967: 300).

In addition, a WRA-WCF .44 caliber cartridge case was collected.

.45 Caliber (Fig. 10.5f)

Two .45 Colt revolver cartridge cases, two .45 caliber Model 1911 automatic pistol cartridge cases, and a single .45-70 rifle cartridge case were collected.

The .45 Colt cartridge case was introduced in 1873 for the "Peacemaker" single action revolver, and was adopted as the official U.S. Army handgun caliber in 1875 until being replaced by the .38 Long Colt in 1892 (Barnes 1965: 172). Of the two .45 Colt cartridge cases collected, the Remington UMC example postdates 1911 (see above) and the precise manufacture date of the WRA example is unknown. This caliber is still in production to date.

The .45 caliber automatic pistol cartridge cases were both manufactured by the Frankford Arsenal and bear headstamp dates of September 1912 and October 1914.

A single .45-70 cartridge case, manufactured at the Frankford arsenal in May, 1888 was collected on the Santa Teresa Project. According to Barnes (1965: 63), the .45-70 cartridge case was used from 1873 to 1892 by the U.S. Military, along with the single shot "trap door" Springfield rifle. Commercial availability of rifles using this caliber was discontinued in the early 1930s. The caliber is still available today for use primarily in Old Springfield rifles, thus making the production date of the collected Peters Cartridge Company example uncertain.

.50 Caliber (Fig. 10.5g)

A single internally primed .50-70 cartridge case was collected. The U.S. Military used this caliber from 1866 to 1873 (Barnes 1965: 115), and production continued throughout the 1880s (Hackley 1967: 266). Barnes (1965: 115) further states that very few rifles of this caliber remain in use, with ammunition almost nonexistent.

Shotgun Shells

Headstamps of the seven collected shotgun shells are illustrated in Figure 10.6. Table 10.5 lists the shell manufacturers, brands, and probable dates of manufacture.

Bullets

The two bullets collected are illustrated in Figure 10.7.

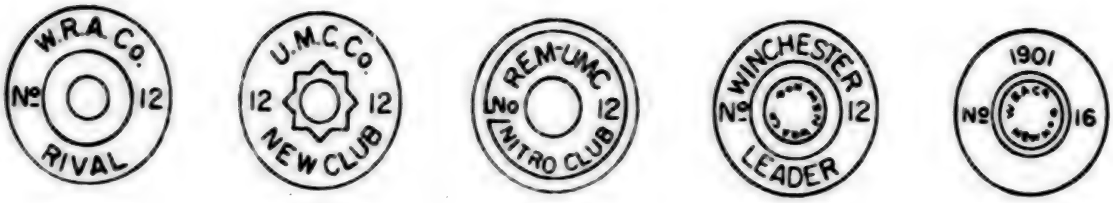

Figure 10.6. Shotgun shell headstamps.

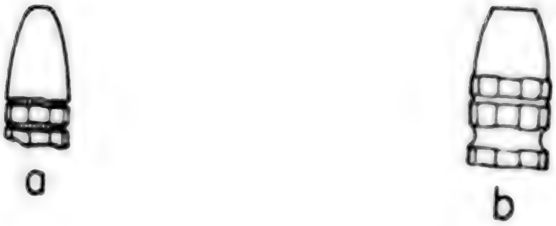

Figure 10.7. Bullets.

Table 10.5

MANUFACTURER AND PROBABLE DATE OF MANUFACTURE OF SHELLS COLLECTED ON THE SANTA TERESA PROJECT

Manufacturer	Brand	Gauge	Date	Source
Winchester	Rival	12	1870s-early 1900s	Vinson 1968: 91
UMC Co.	New Club	12	Prior to 1910	Date at which headstamp changed to REM-UMC
REM-UMC	Nitro Club	12	1910-1960	Vinson 1968: 91
WRA Co.	Leader	12	1894-present?	Vinson 1968: 91
WRA Co.	Leader	12	1894-present?	Vinson 1968: 91
WRA Co.	Leader	12	1894-present?	Vinson 1968: 91
WRA Co.	Leader	16	1901	Headstamp date

Bullet A was factory produced and likely used with a .38 caliber cartridge. The diameter of approximately 0.357 to 0.359 inches suggests the bullet was associated either with .38 Colts or .38 Smith and Wessons (Barnes 1965: 177). The bullet weighs 153 g, a slightly low weight due to deformity, eliminating the Colt weapons (bullets for which weigh 130 g to 150 g) and associating the bullet more firmly with the .38 Smith and Wesson or .38 Smith and Wesson Special.

Bullet B is a homemade, cast, semiwad cutter bullet with a diameter of 0.424 inches and weighing 244 g. The diameter is 0.005 inches less than that specified for a .44 Smith and Wesson Special or .44 Smith and Wesson Magnum, though grain weight is appropriate for both weapons (Barnes 1965: 168-169). The Smith and Wesson Special cartridge was introduced in 1907 and is still popular for target or field use. The Smith and Wesson Magnum was introduced in 1955 and is used as a field or hunting round (Barnes 1965: 168-169). The almost pristine quality of the collected specimen suggests it is of a fairly recent vintage.

Other Metal Objects

Cans

A total of four whole or partial tin cans were collected, three of which were hole-in-top, soldered cans. Two of these are complete and represent a No. 1 and a No. 2 size can. A solder plate was the only remains of the third hole-in-top can. The fourth can consisted only of body fragments. By World War I, manufacturing and sterilization methods had improved in the canning industry, resulting in tin cans with crimped ends and no soldering (Hunt, n.d.: 9).

Knives

A butcher knife, table knife, and pocket knife were collected. The butcher knife has a 6-1/2 inch curved blade with a 2 inch haft remnant. Hafting rivets occur on both sides and are arranged in a triangular fashion. The table knife has a Japanned iron handle, and is identical to one offered in the 1929 Holbrook, Merrill and Stetson Hardware Catalog (1929: 171). The handle is 3.925 inches long, 0.65 to 0.80 inches wide and 0.3 inch thick.

Buckles

The two buckles collected are associated with horse tack. The first is a circular cinch buckle 2-1/2 inches in diameter. The buckle tongue is formed by a twisted, corrugated wire. A bar-buckle measuring 2-5/8 inches by 2 inches and accommodating a 1.32 inch wide strap is likely a harness buckle.

Miscellaneous

The three remaining metal objects consist of a chain, a horseshoe, and a track wrench. The chain contains two oblong links. Each link is formed by a 0.175 inch thick piece of galvanized iron. The six-holed horseshoe was probably fitted to a donkey or pony as standard horseshoes sport eight holes. No caulks had been added to the shoe. The track wrench is similar to that advertised in the California Hardware Company Catalog 12-C (1947: 69) and is most certainly associated with the railway that passed through the project area. The wrench is 24 inches long and has a 1-3/4 inches standard opening.

Chapter 11

PREHISTORIC LAND-USE AND SPATIAL PATTERNING IN THE MESILLA BOLSON

Christopher Pierce and Stephen R. Durand

Land-use studies in archaeology generally involve documenting the relationship between the distribution of resources and spatial patterning observed in the archaeological record. Inferences are then drawn concerning the nature of resource use and how that use has changed through time. Spatial variability in the archaeological record is usually measured at the level of sites, which are divided into functional types (for example, residential, limited activity, and so forth) based on traits such as size, assemblage composition, and features. These different site types are thought to have been produced by functionally distinct activities making them relevant for land-use analysis. However, site typologies and the criteria on which they are based are extremely inconsistent between individual studies, which results in noncomparable data sets and conflicting results. These problems are inherent in a site-based approach where site boundaries must be distinguished in the field. They are further compounded in areas like south-central New Mexico where the archaeological record is dominated by dispersed, surface lithic and sherd scatters whose boundaries are often arbitrarily defined.

A conscious effort was made to minimized these problems while recording and analyzing the archaeological resources of the Santa Teresa study area. In addition to recording sites, isolated manifestations (IMs) and isolated artifacts (IAs) in the traditional manner, the study area was divided into 100-square-meter units and artifacts and features located in these grid squares were given a unit provenience in addition to their site or IM association (see Chapter 5). This level of data is available for 1259 of the 2272 grid units within the project area. The artifacts from 300 of these squares (6 north-south transects) were analyzed in the laboratory at the Desert Research Institute (DRI) while the rest were analyzed in the field during the course of the survey or in the DRI laboratory as portions of collected sites (see the field and laboratory methods sections of this report). The field analytic categories included features, fire-cracked rock, ground stone, ceramics, chipped stone (tools and debitage combined), other artifacts, and historic artifacts. By recording the archaeological record in this way, artifacts and features are seen as spatially continuous distributions across the resource landscape, thus reducing the biases introduced through delineating site boundaries in the field and applying *a priori* site taxonomies.

As stated above, an understanding of the resource environment is as important for land-use studies as adequately documenting archaeological variability. Unfortunately, the condition of resources in the Santa Teresa study area [illegible] altered from that existed in prehistory. The recent movement of large, modern sand dunes into the project area from Mexico has significantly affected the distributions of plant and animal resources and has covered a large portion of the old ground surface. Present plant and animal distributions in the study area are controlled primarily by the modern surficial geology, land-use and climate, and to a lesser extent by topography and hydrology. Therefore, their distributions are not representative of past conditions.

The only measures of the resource environment today that reliably reflect past conditions are topography and geologic substrate. The geologic substrate here consists of coarse, sandy, paleosol which contains dense calcium carbonate accumulations and occasional small pebbles (see Chapter [illegible]). The pebbles in the substrate were probably not a significant resource because they are too small to be worked into tools and are relatively rare and homogeneously distributed. The calcium carbonate was commonly used in heating or cooking, but it is fairly evenly distributed reducing its importance as a locational factor. There is relatively little topographic variability within the project area with only [illegible] vertical feet separating the highest and lowest points. However, three distinct topographic features exist. In the northwest and southeast portions of the study area there are several, large, closed depressions that show no indications of having been playa lakes, but at least constitute areas of concentrated run-off. Between these depressions, there are two, low, northwest-southeast trending scarps, and an area of [illegible] higher ground between the scarps (Figs. 11.1 and 11.2). In addition, the Rio Grande escarpment lies less than 1 km to the northeast of the project area.

In the locational and activity patterning analyses presented below, only distributional or "nonsite" archaeological data are used. These data are preferable to site based data for four reasons: (1) site boundaries are heavily influenced by visibility of the old ground surface in deflation basins; (2) there are no readily distinguishable site types in the Santa Teresa study area; (3) the assemblage size and composition of sites [illegible] sample [illegible]; and (4) artifact concentrations exist in locations where no sites were defined (Fig. 11.3). By introducing [illegible] biases into the data, these factors can distort the observed structure of archaeological materials. Since the "nonsite" data [illegible] assumptions concerning the nature of the archaeological record and avoid the problems outlined above, they are considered more appropriate for the spatial analyses conducted in this study. A detailed comparison of "site" and "nonsite" approaches is currently underway (see Chapter [illegible] of this report).

The following analyses are divided into two parts. First, the distributions of all artifacts are compared to various aspects of topography in an attempt to document general locational patterning in relation to resources in and around the study area. Second, the distributions of individual artifact classes are compared to one another and to topographic features to determine the general nature of activity patterning. In both of these analyses, all artifacts are treated as a single temporal unit. No temporal assignments are made

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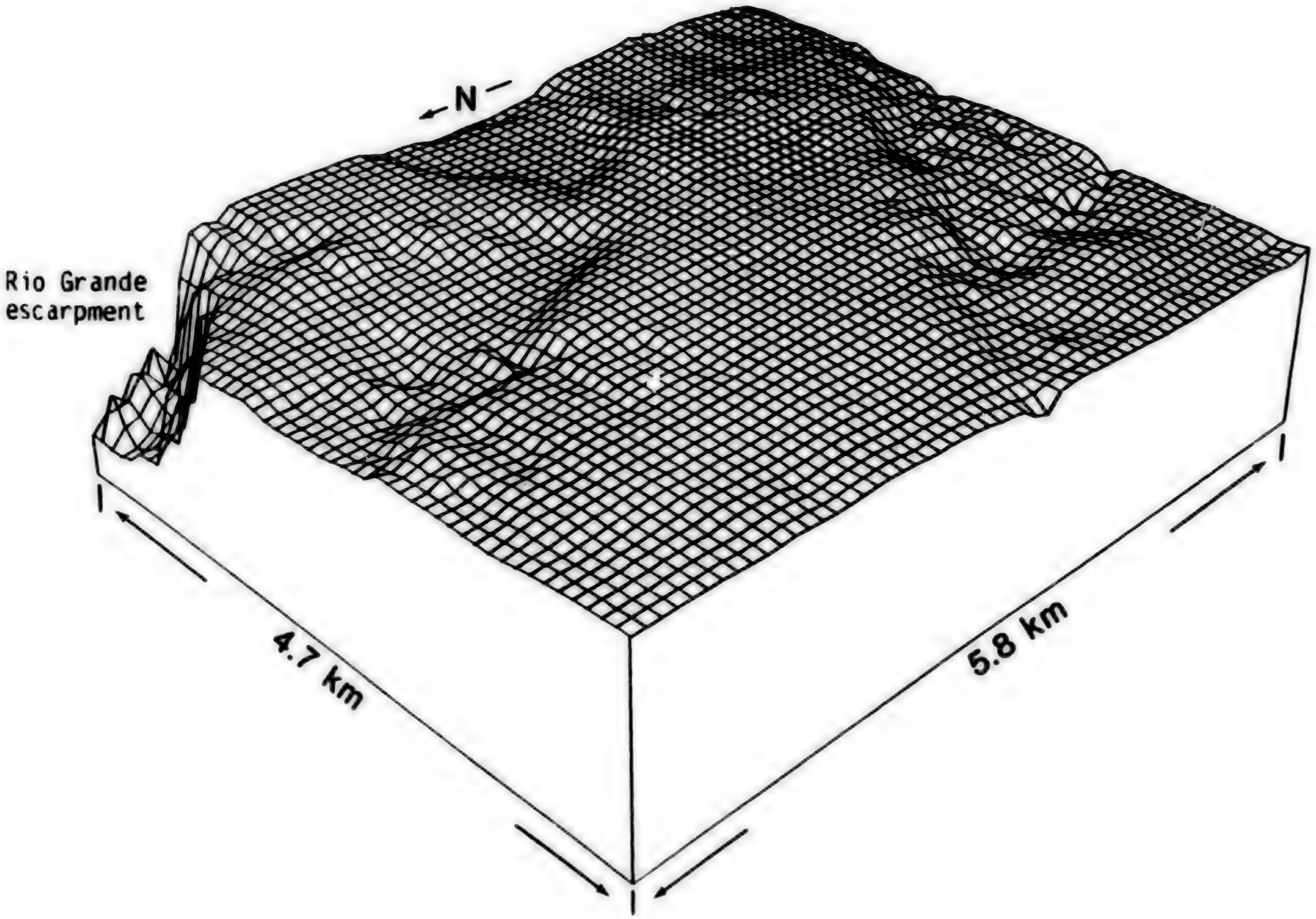


Figure 11.1. Perspective view of the Santa Teresa research area based on a digital elevation model. Elevations recorded every 100 m. View to the southeast. Elevation of the box base = 1189 m (3900 ft.). Vertical exageration = 20. 30 degree tilt. Small scale landforms not shown.

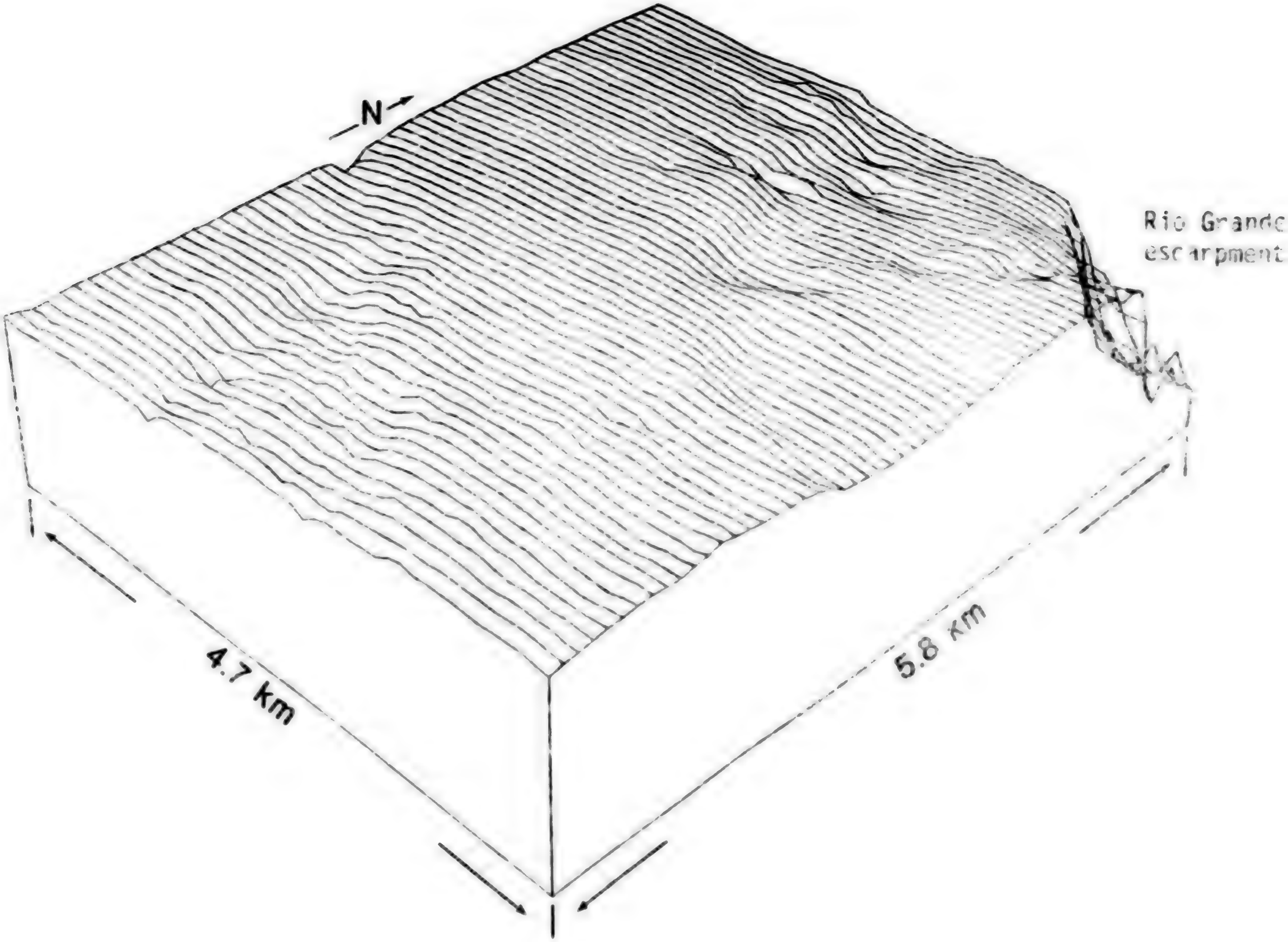
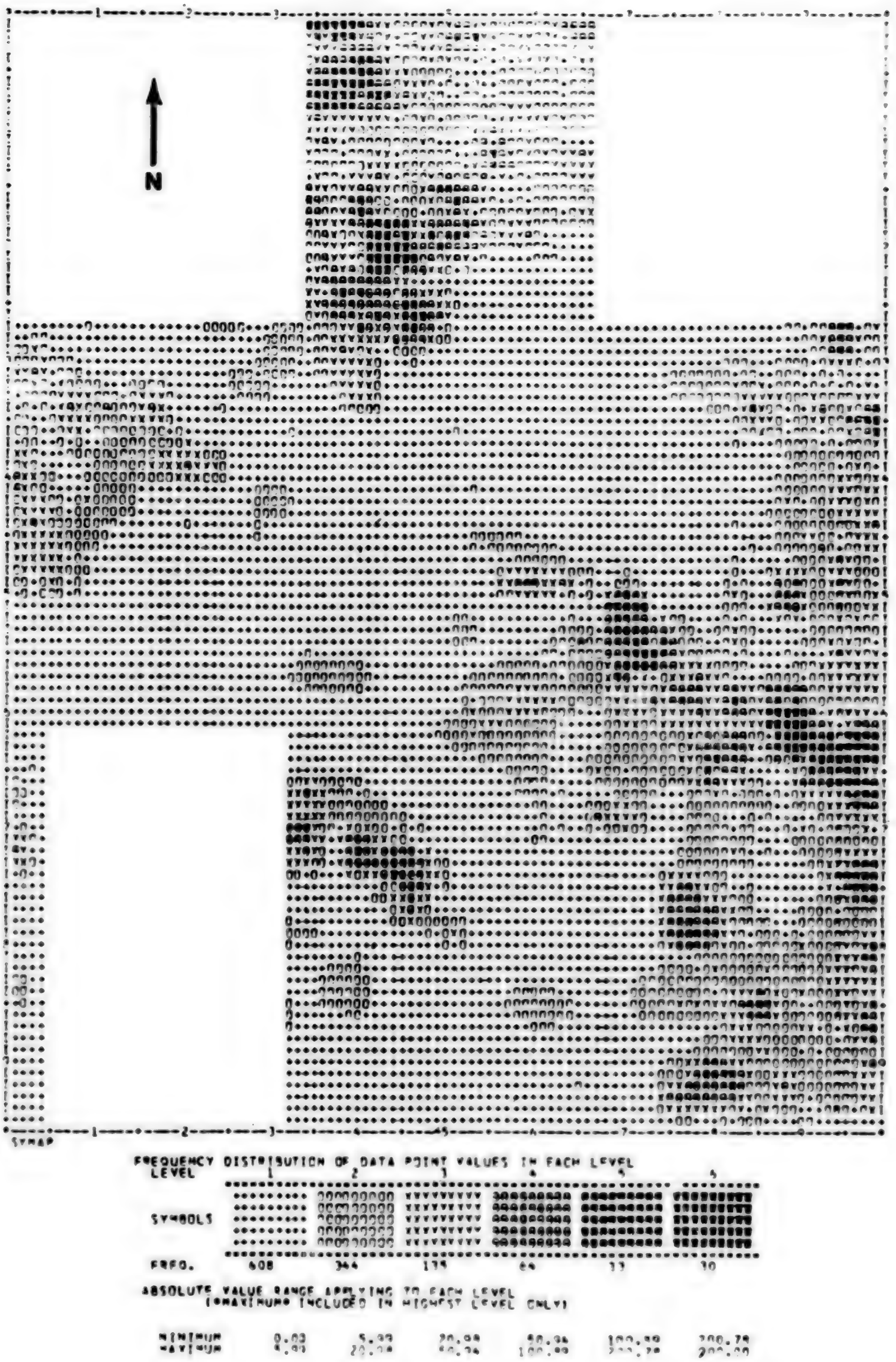


Figure 11.2. Perspective view of the Santa Teresa research area based on a digital elevation model. Elevations recorded every 100 m. View to the northwest. Elevation of the box base = 1189 m (3900 ft.). Vertical exageration = 20. 30 degree tilt. Small scale landforms not shown.

238


N
SYMAP
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
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SYMBOLS
FREQ. 608 344 135 64 13 10
ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
(MAXIMUM INCLUDED IN HIGHEST LEVEL ONLY)
MINIMUM 0.03 5.99 20.08 50.36 100.99 200.79
MAXIMUM 4.99 20.08 50.36 100.99 [illegible] [illegible]

Figure 11.3. Distribution of all artifacts in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.

exceedingly difficult by reoccupation, severe deflation, and a general lack of chronological control in the region. The distributions of sites for which temporal designations exist (see Chapter 12) show little pattern independent of site density and the number of sites assigned to a particular phase.

Locational Patterning in the Santa Teresa Study Area

Figure 11.4 depicts the distributions of all prehistoric and historic artifacts in the project area with interpolations between data points using the SYMAP program. Artifact frequency data used to construct artifact distribution SYMAPs are presented in Table E.1. The blocked out portion of the figure is an area for which insufficient distributional data were collected for accurate interpolation. Three sites were identified in this area (Fig. 11.3) which give some indication of artifact distributions. When the mapped surficial geologic units are overlaid on the SYMAP of total artifact distributions (Fig. 11.5), it is apparent that there is a strong association between the geologic units and spatial patterns in artifact frequency. However, the modern surficial geology is not a good indicator of prehistoric resource distributions, but instead reflects archaeological visibility in the region. As a result, an attempt is made to control for visibility in some of the analyses presented below by eliminating sample squares recorded in Zone 3 (see Chapter 2, the Geomorphology section for descriptions of the zones). In the following analyses, the relationship between topographic variability and spatial patterns in artifact frequency within Zones 1 and 2 are assessed through visual pattern recognition and quantitative comparison. These analyses are based on the expectation that variation in artifact frequency in these zones reflect differences in the occupation and use of the landscape.

Inspection of geomorphic Zones 1 and 2 on Figure 11.5 reveals that low to moderate frequencies of artifacts were recovered over much of the area, but units of high artifact frequency tend to occur in a linear pattern following the low scarps that traverse the study area and on the highest points between the scarps. Attention was focused on defining the factors that may have led to the regular selection of these areas for artifact-producing activities.

One possibility considered was the locational significance of the several topographic depressions in the study area. Studies of site locations in other bolson regions of south-central New Mexico and western Texas have found that the distance to playa lakes is a major factor in the location of concentrations of archaeological sites (Beckes 1977; Carmichael 1982a; Marshall 1973; Pigott 1978; Whalen 1978). The depressions within the Santa Teresa study area are not playa lakes, but probably contained a somewhat greater density and diversity of food resources than the other topographic features in the area. These probable differences in resource and run-off potential may have attracted people to these locations. However, in terms of distance, there are many locations within the project area which are closer to the depressions, but produced very few artifacts. In fact, some of the

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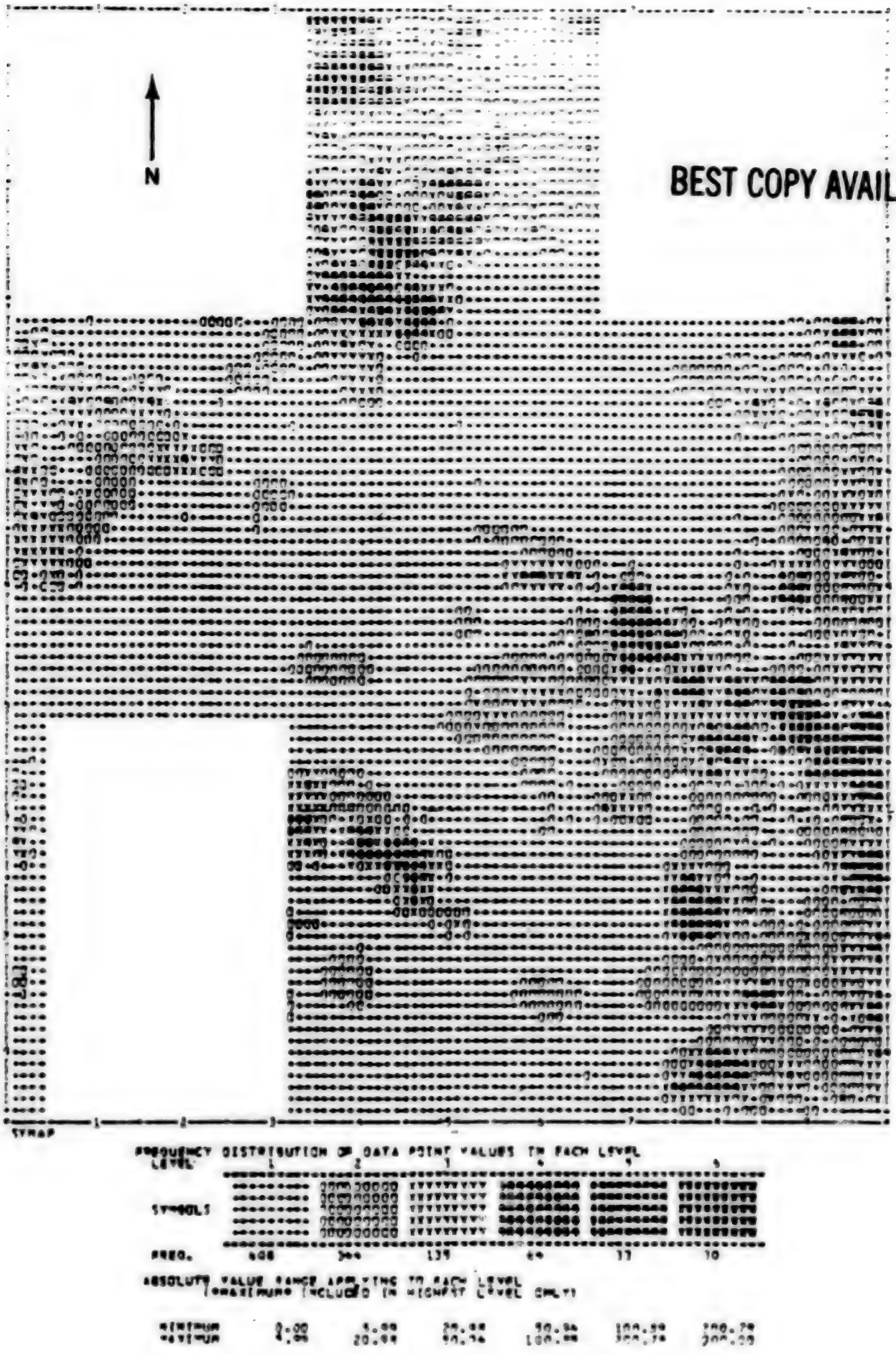
N
SYMAP
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
LEVEL
SYMBOLS
FREQ.
ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
(MAXIMUM INCLUDED IN HIGHEST LEVEL ONLY)
MINIMUM
MAXIMUM

Figure 11.4 Distribution of all artifacts in the Santa Teresa study area. Map dimensions: 3 miles, east to west: 3.5 miles, north to south.

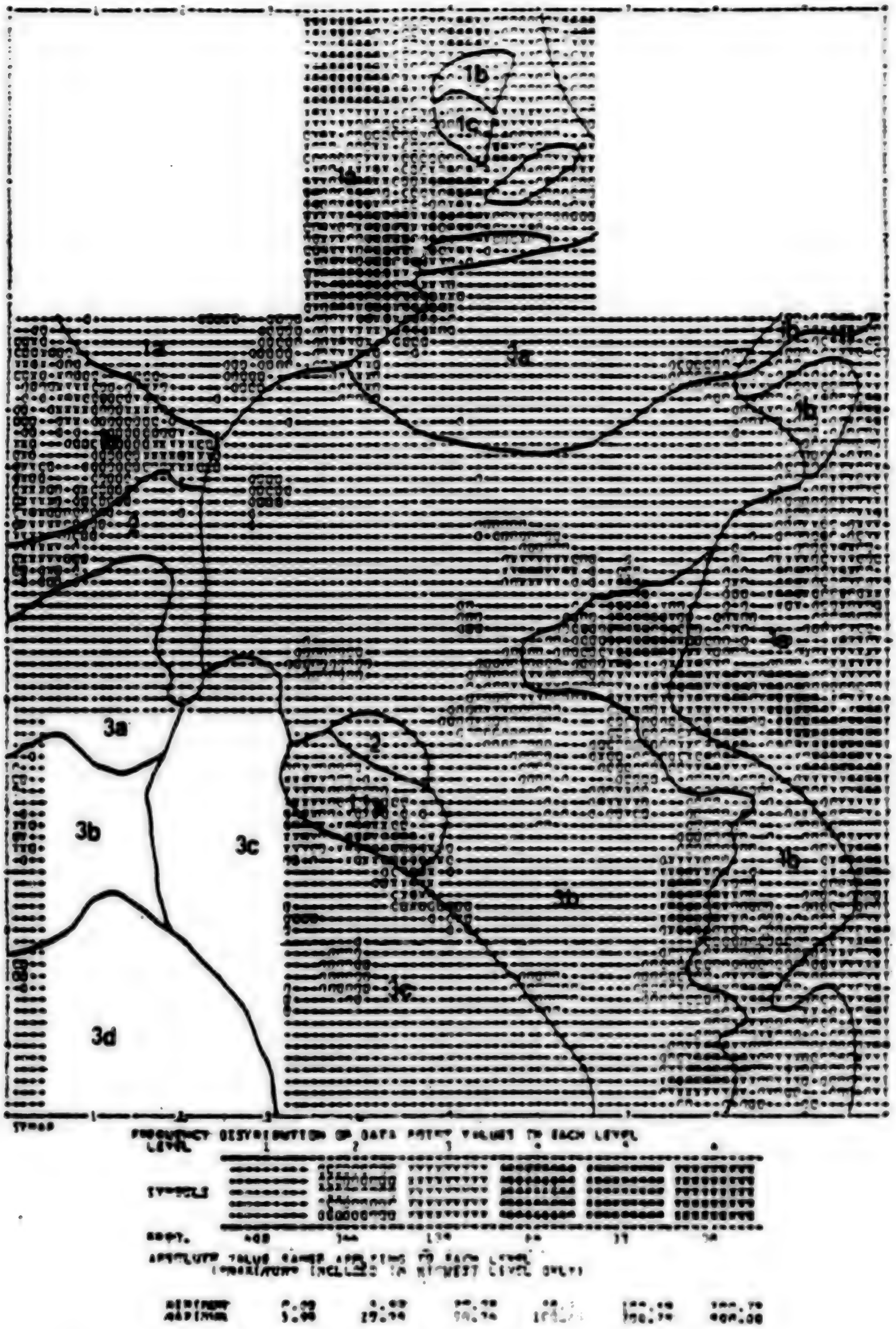

Figure 11.5. Map of project area, showing geological zones overlaid on a contour plot of artifact density.

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locations of high artifact concentrations are located in the positions of greatest distance from depressions of significant magnitude (greater than 5 feet deep).

Because the closed depressions did not provide a particularly good means for predicting the locations of artifact concentrations, attention shifted to the elevated areas themselves. The scarps and high ground between the scarps share at least one significant attribute in common--view. In this area of extremely level topography and relatively homogeneous resource environment, a location that afforded a view of the surrounding area may have provided an important advantage over lower terrain with very low lateral visibility.

To test the relationship between view and artifact frequency, a View Index was developed, which quantifies the view potential of a given location. The index includes the variables of slope and elevation in the following form.

$$\frac{S\ (E - [E_{min} - 1])}{S_{max}\ (E_{max} - [E_{min} - 1])}$$

where: S = Change in elevation;
E = Elevation in feet above sea level of location in question;
S_{max} = Maximum calculated δS for the study area;
E_{max} = Maximum elevation of study area in feet above sea level;
E_{min} = Minimum elevation of study area in feet above sea level.

The first step in calculating this index is to record elevation measurements from a topographic map at 100-m intervals over the entire study area. The current maximum and minimum elevations are each taken from this matrix. The calculation of δS involves several steps. First, the elevations of points 100 m away in the four cardinal directions are each subtracted from the elevation of the location in question. If any of the four resulting values are negative, those directions are ignored in subsequent steps. In the directions where positive values are attained, the elevation of the point 200 m away in the same direction is again subtracted from the elevation of the location in question. The sum of the two differences in elevation is the δS value used in the equation. If the initial step results in negative numbers in all directions measured, a value of zero is assigned for the δS. The View Index can range from 0 to 1, worst view to best view respectively.

The View Index was calculated for each 100-square-meter unit in the study area. The units for which artifact data exist were then grouped into the frequency classes used on the SYMAPs and the View Index means and standard deviations were calculated for each class. Figure 11.6 depicts graphically the results of this analysis. Two things are apparent from the graph. First, mean View Index increases directly with artifact frequency class, and the variation around the mean increases as the mean increases. Thus, there is a definite tendency for units with

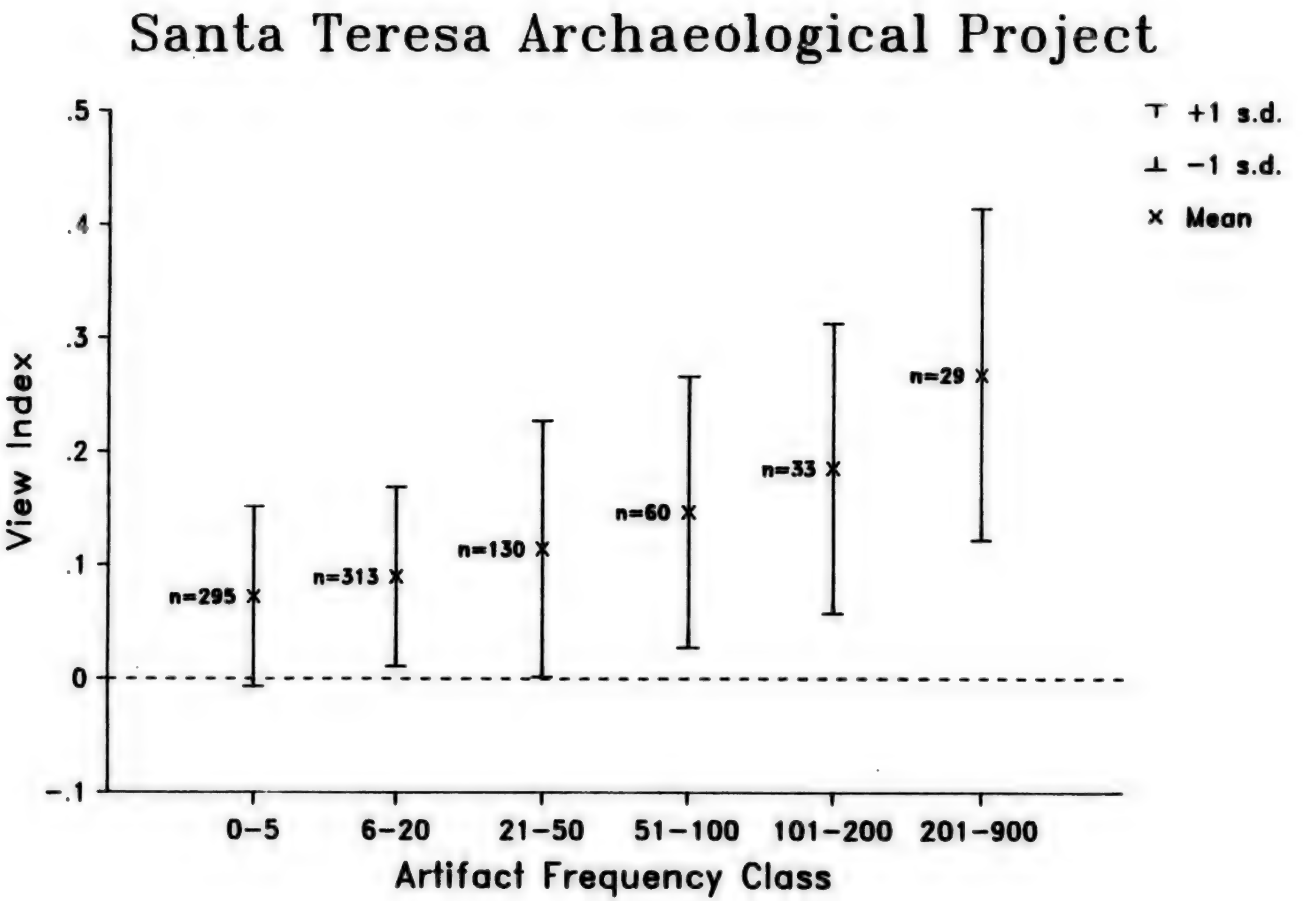


Figure 11.6. Mean and standard deviation of View Index for total artifact frequency classes, Santa Teresa study area.

high artifact frequencies to be located in areas with greater view potential. The standard deviations around the means show that there is also considerable variability in the association of high artifact density and high View Index, but little variation in the association of low View Indices and low artifact densities.

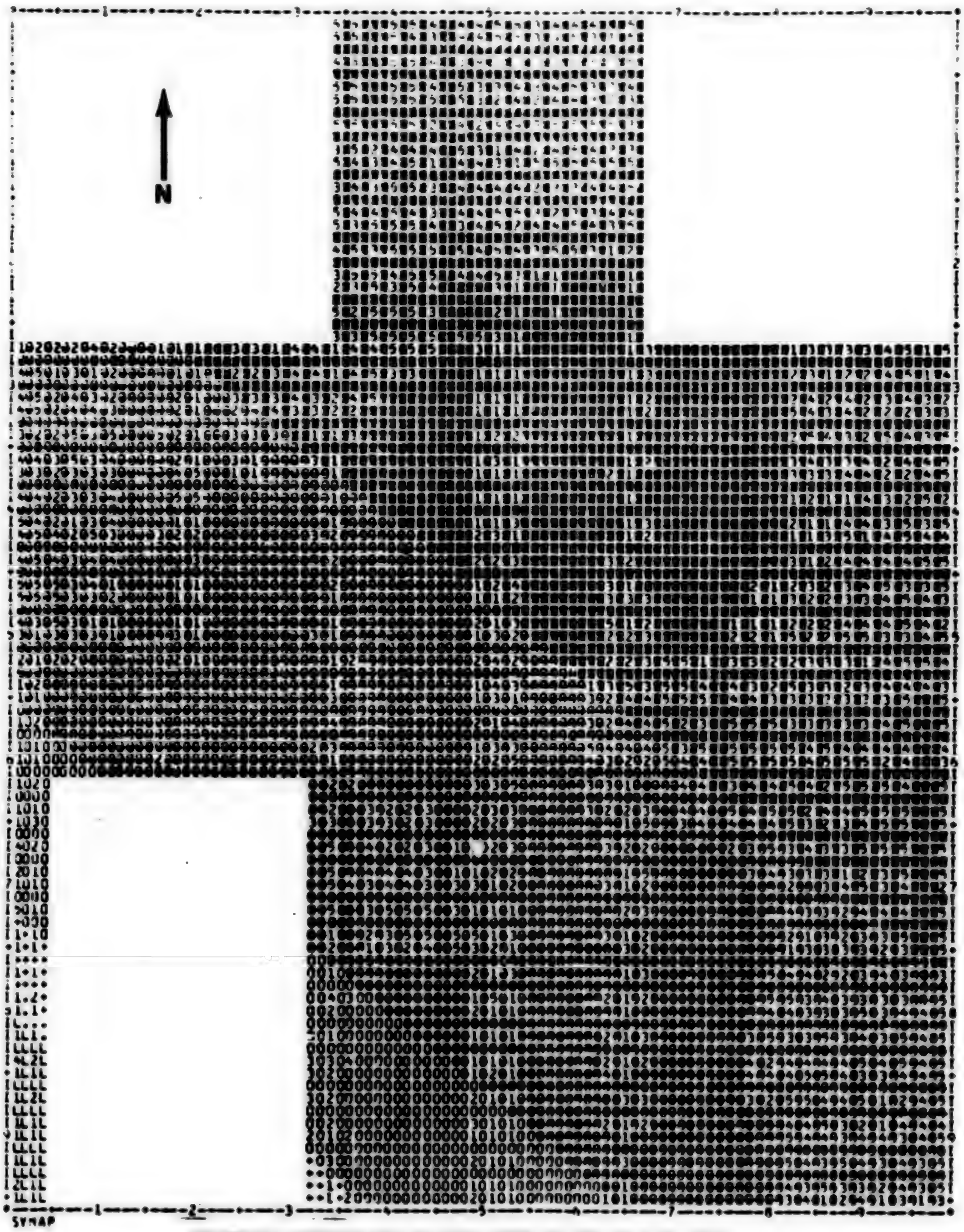
Another factor that may have controlled locational patterning in the Santa Teresa Project area is the distance to the escarpment of the Rio Grande River. To test the possible significance of this factor, a planar surface was fitted to the distribution of artifact frequencies using a first order trend surface analysis (Fig. 11.7). The surface is a plane of decreasing artifact density oriented northeast-southwest, with the contour bands parallel to the Rio Grande escarpment. However, this is a very general pattern as demonstrated by the very low correlation between the fitted surface and the actual artifact distributions ($r=0.1386$) and very little explained variation (explained variation = 7.6×10^4; total variation = 4.0×10^6).

It seems clear from these analyses that no single factor exerted a dominant control over the locations of generalized artifact producing activities within the Santa Teresa Project area. However, a combination of the attraction of economic resources within the project area and in the Rio Grande Valley, and the ability to see over a larger area appear to have been controlling factors in the selection of locations for occupation and use. Some of this ambiguity in locational patterning is a by-product of observing the distributions of all artifacts together. By separating distinct artifact classes, the relationships between the various resource and locational factors and different activities are assessed in the following section.

Activity Patterning in the Santa Teresa Project Area

Distributional data are available on the four general artifact classes recorded in the field. More detailed laboratory data were generated from the artifacts collected in the 100-square-meter units along the six 100-percent-collection transects. These data have not been analyzed to an extent that the more detailed information could be integrated with the field-level data recorded in the rest of the study area. Therefore, this analysis of activity structure is restricted to spatial patterns observable in the distributions of chipped stone, ground stone, ceramics, fire-cracked rock, and hearth features.

SYMAPs of the four artifact classes (Figs. 11.8 through 11.11) and a map of the distribution of hearth features (Fig. 11.12) were prepared for visual pattern recognition. It is apparent from these maps that the distributions of the different artifact classes and features are not identical. Pottery and ground stone have similar, relatively restricted, spatial distributions. Fire-cracked rocks and hearth features are regularly found in the same locations as pottery and ground stone, but they also occur over a wider area. Substantial concentrations of chipped stone artifacts are present in areas where pottery and ground stone occur in very low frequencies and there is at



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  SYMBOLS     ....1.....  ....2.....  0000300000              ....5....
              ..........  ..........  0000000000
  FREQ.         237        199        286        242        250

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
      (*MAXIMUM* INCLUDED IN HIGHEST LEVEL ONLY)

  MINIMUM       0.00       1.00       3.00       9.00      23.00
  MAXIMUM       1.00       3.00       9.00      23.00     900.00
```

Figure 11.7. 1st order trend surface of total artifact frequency in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.

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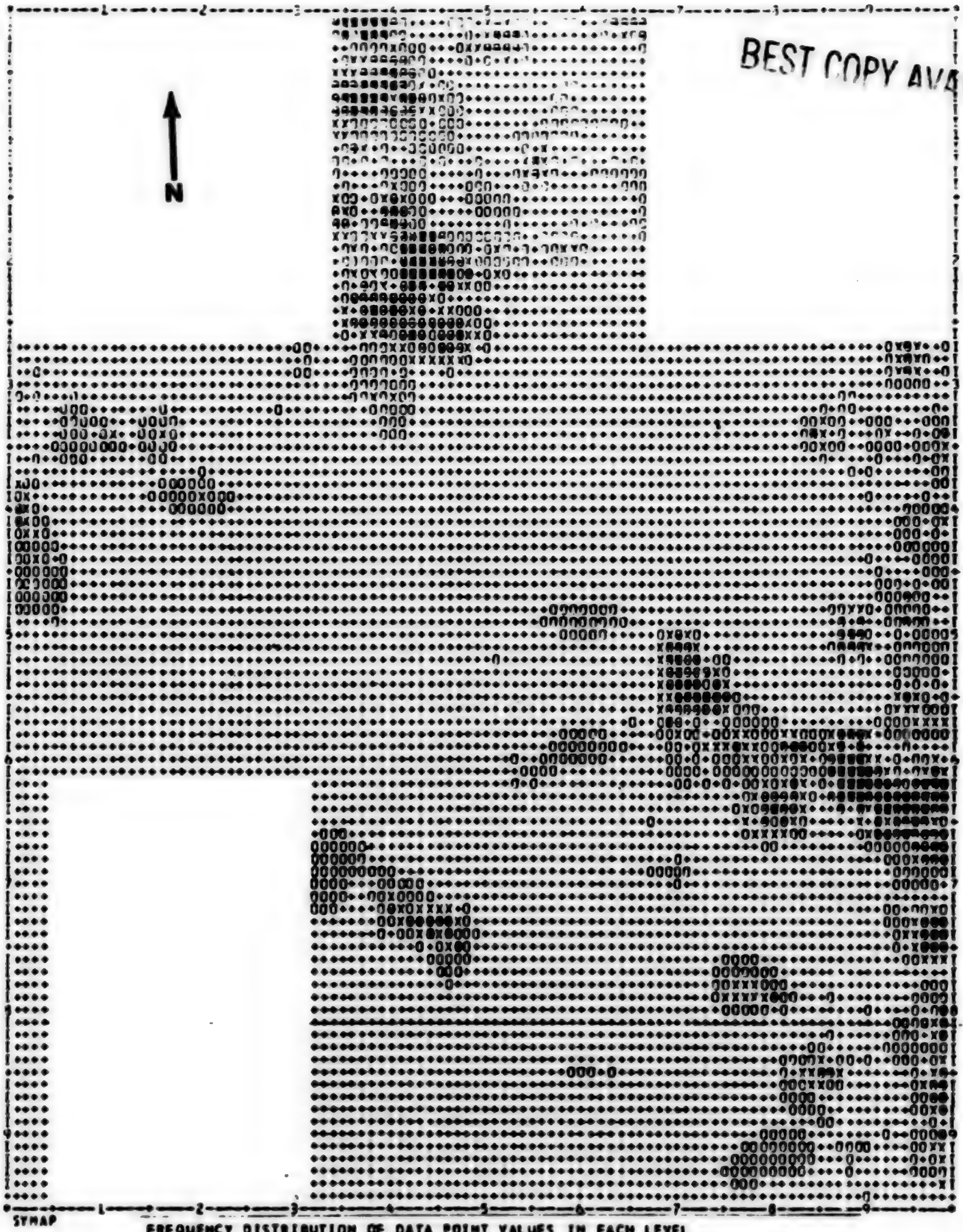

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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
LEVEL           1          2          3          4          5          6

FREQ.          911        191         39         34         27         12

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
        (*MAXIMUM* INCLUDED IN HIGHEST LEVEL ONLY)

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  MAXIMUM  [illegible] [illegible] [illegible] 99.13   [illegible]   492.00
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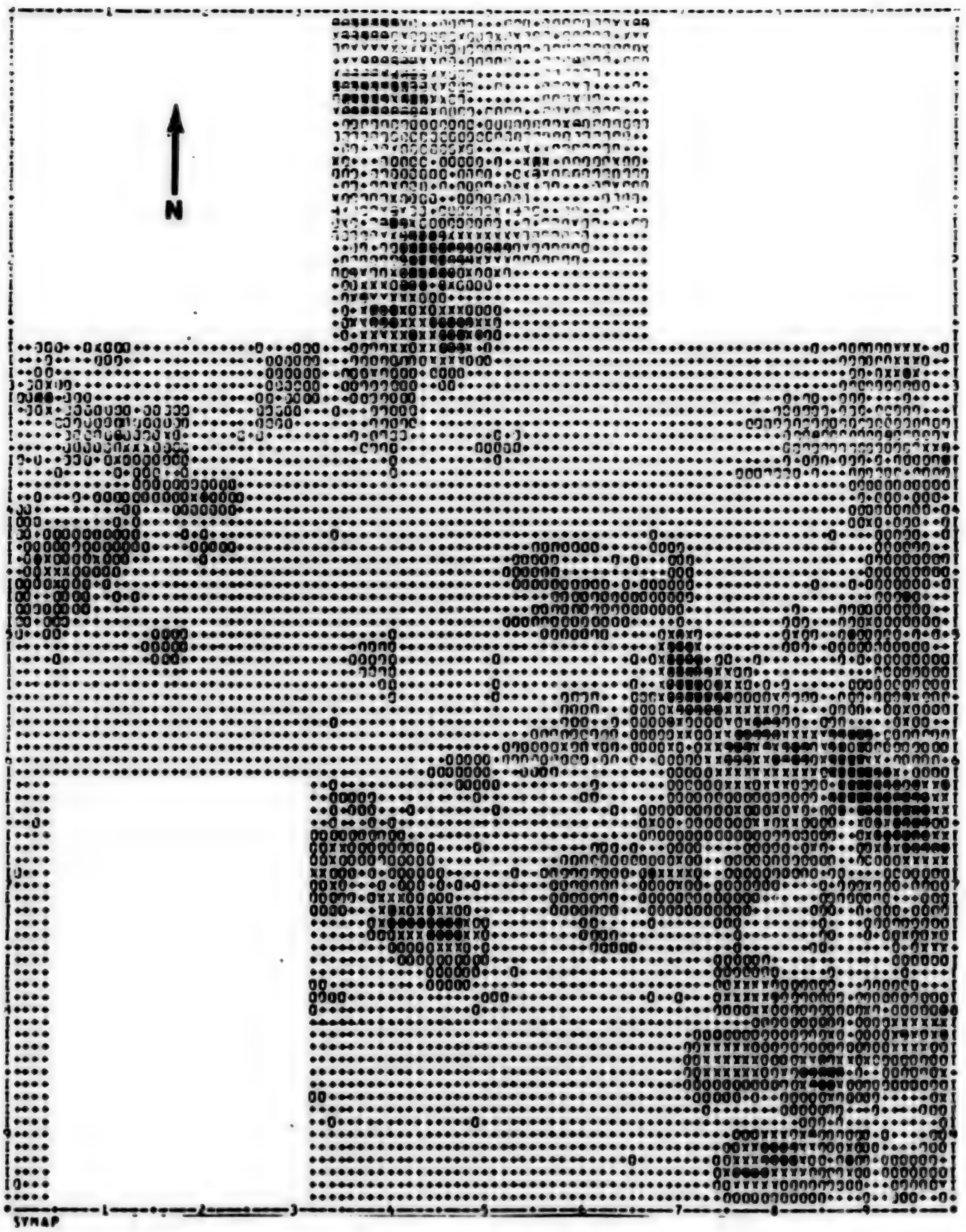
Figure 11.8. Distribution of ceramic artifacts in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.



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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
LEVEL           1            2            3            4            5            6

FREQ.          580          465           82           52           23           12

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
     (*MAXIMUM* INCLUDED IN HIGHEST LEVEL ONLY)

MINIMUM       0.00          .99         4.96         8.92        16.45        32.72
MAXIMUM        .99         4.96         8.92        16.85        32.72       114.00
```
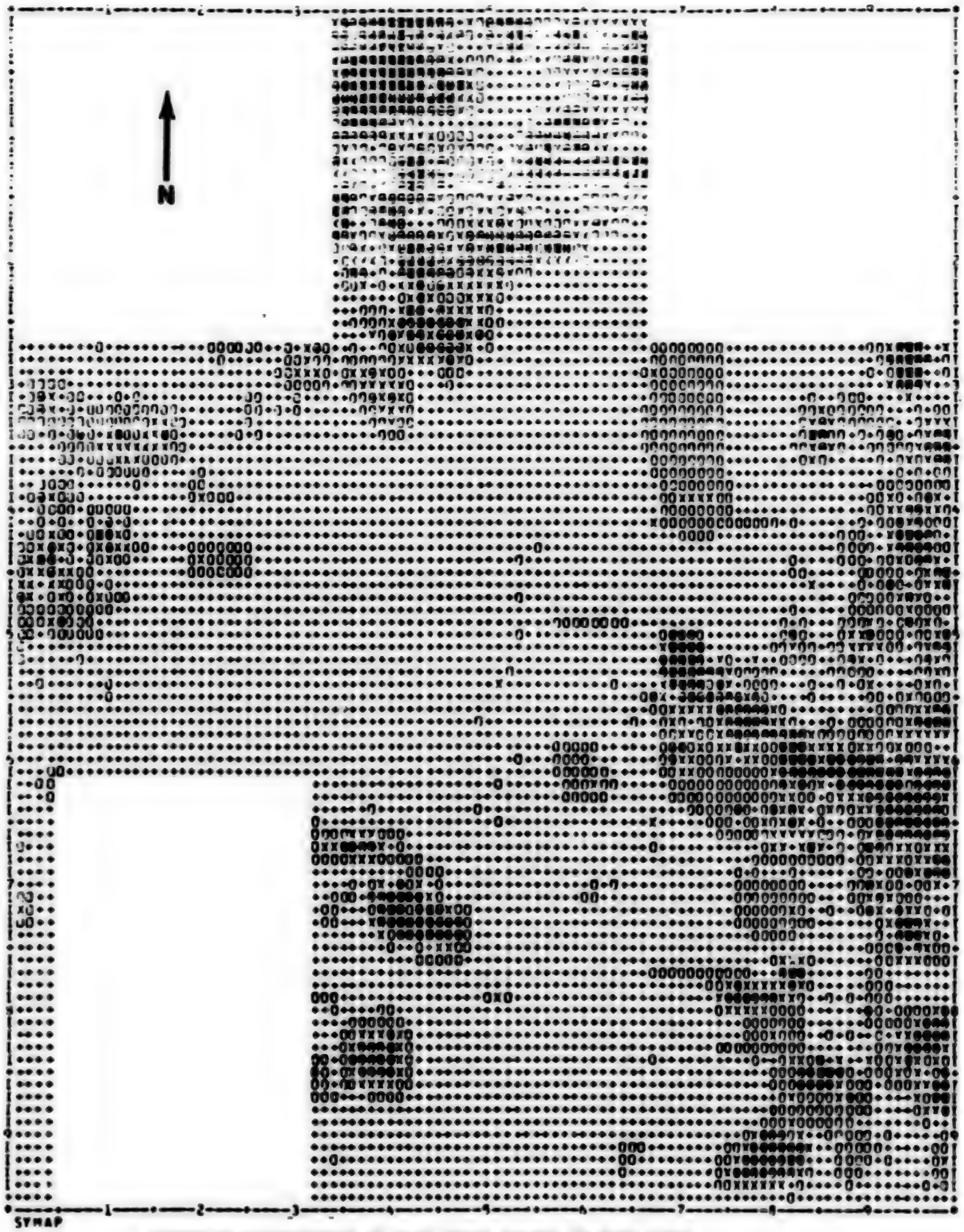

Figure 11.9. Distribution of ground stone artifacts in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.



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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
 LEVEL        1          2          3          4          5          6
        ----------------------------------------------------------------
           ......... 000000000 XXXXXXXXX ●●●●●●●●● ■■■■■■■■■ █████████
           ......... 000000000 XXXXXXXXX ●●●●●●●●● ■■■■■■■■■ █████████
 SYMBOLS   ......... 000000000 XXXXXXXXX ●●●●●●●●● ■■■■■■■■■ █████████
           ......... 000000000 XXXXXXXXX ●●●●●●●●● ■■■■■■■■■ █████████
           ......... 000000000 XXXXXXXXX ●●●●●●●●● ■■■■■■■■■ █████████
        ----------------------------------------------------------------
 FREQ.       680        269         95         69         61         41

 ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
      (*MAXIMUM* INCLUDED IN HIGHEST LEVEL ONLY)

  MINIMUM      0.00        .95       2.95       4.91       8.94      16.70
  MAXIMUM       .95       2.95       4.91       8.94      16.70      56.00
```

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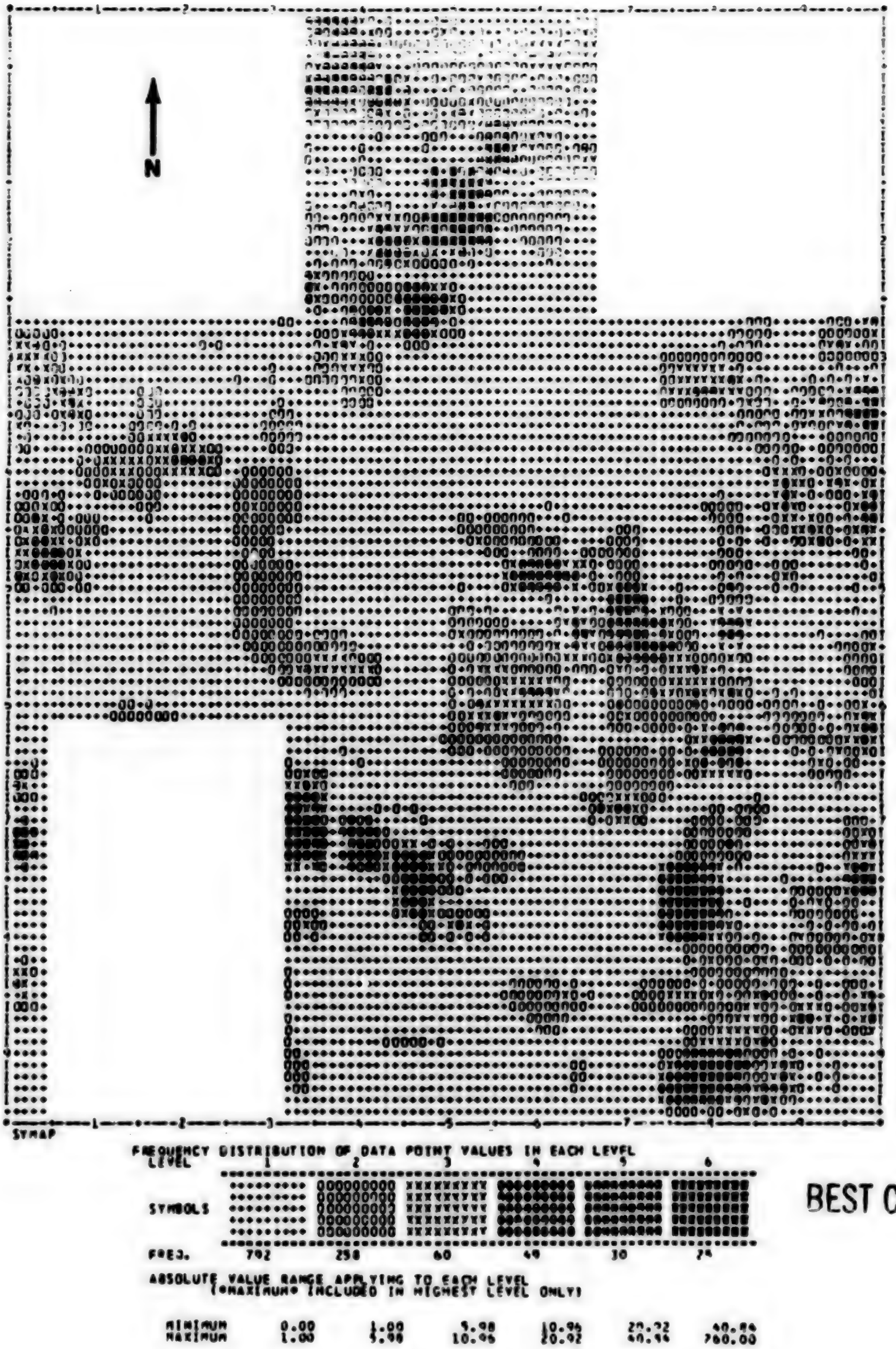
Figure 11.10. Distribution of fire-cracked rock in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.



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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL
LEVEL          1          2          3          4          5          6
FREQ.         792        258         60         49         30         24

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL
     (*MAXIMUM* INCLUDED IN HIGHEST LEVEL ONLY)

  MINIMUM     0.00       1.00       5.98      10.96      20.92      40.84
  MAXIMUM     1.00       5.98      10.96      20.92      40.84     760.00
```

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Figure 11.11. Distribution of chipped stone artifacts in the Santa Teresa study area. Map dimensions: 3 miles, east-west; 3.5 miles, north-south.

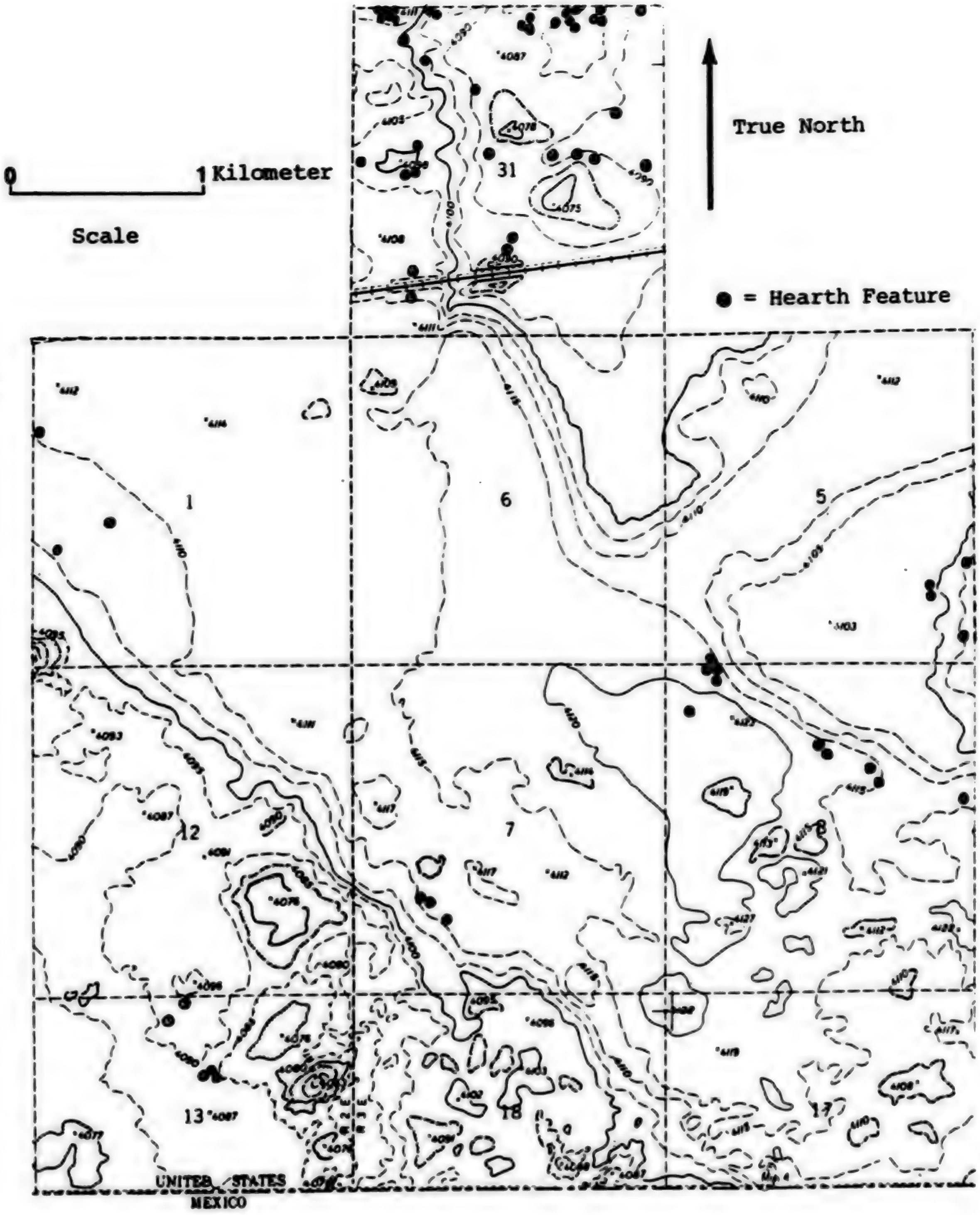


Figure 11.12. Distribution of Hearth Features in the Santa Teresa study area.

least one location where the opposite is true. These spatial patterns in the distributions of artifact classes correspond closely to the locations of important topographic features. Pottery and ground stone concentrations are restricted almost entirely to the low scarps that traverse the study area. Concentrations of chipped stone and fire-cracked rock also occur in spots along these scarps, but other dense concentrations of these artifacts are present below the scarps near the closed depressions and on the high ground between the scarps. The locations of hearth features are restricted to the scarps and the low ground near the depressions.

The distributional differences of these general artifact classes are thought to reflect the organization of broad activity types carried out during the past. The association of pottery, ground stone, and hearth features in areas of relatively good views may indicate the locations of temporary camp sites. Chipped stone, fire-cracked rock, and hearth concentrations near the closed depressions and chipped stone concentrations on the higher ground between the scarps may represent locations of specific extractive or processing activities.

Summary

The locational and activity pattern analyses presented above indicate that the structure of the resource base as represented by topographic variability resulted in a differential spatial use of the Santa Teresa study area. This is apparent in the general pattern of artifact density across the area and in the distributional patterns of specific artifact classes. It is difficult to infer what specific resources were being used and how they were exploited from this initial treatment of the available data. Further analyses of more specific artifact data are in progress but small sample sizes may prohibit more detailed conclusions. The problem of documenting changes in land use through time is also difficult because of the lack of tight chronological control of most of these surface materials. However, what information is available indicates that little change occurred in the locations of artifact-producing activities through time. Inferences regarding changes in specific land-use patterns must be based on more data than are currently available.

The archaeological data generated by the Santa Teresa Archaeological Project are unique in that they include information on artifact and feature distributions in addition to data from sites defined in the field. The distributional or "nonsite" data allowed different kinds of analyses to be conducted, which are impossible when information is restricted to sites only. A methodological question yet to be fully addressed is whether analyses of the two data sets would result in recognition of the same spatial patterns. A study of this kind is currently underway and will be reported at a later date.

Chapter 12

SUMMARY

Cynthia Irwin-Williams and John C. Ravesloot

This report summarized the inventory, evaluation, and data recovery of the cultural resources of 10 parcels of land within the Santa Teresa study area that are proposed for exchange as part of the Navajo-Hopi relocation project. A review of existing archaeological literature and a preliminary field reconnaissance of the Santa Teresa project area in southern New Mexico indicated that cultural resources encountered would be predominately multicomponent surface artifact scatters related to short-term procurement and processing activities (see chapter 3). A geomorphological assessment (see chapter 2) of this area indicated that the historic movement of sand dunes within the Mesilla Bolson had greatly affected the visibility and integrity of the cultural resources. Nonetheless it was concluded that the Santa Teresa resources could contribute to our understanding of the region's prehistory. Several general and interrelated research problems were selected to guide our studies (see chapters 3 and 4). These included documenting the temporal variability in the study area resources, providing functional classifications of the resources, developing a survey and collection methodology that would improve our interpretation of surface artifact scatters, and addressing the changing nature of prehistoric land use patterns within the Mesilla Bolson. What follows is a summary of research results and conclusions not discussed in the preceding chapters, specifically changing land-use patterns in the southern Tularosa Basin, Hueco and Mesilla Bolsons.

Settlement Patterns

A primary research question identified for the Santa Teresa project (Irwin-Williams and others 1984b; Ravesloot 1984) has the comparison of settlement patterns through time for the Mesilla Bolson with those of the adjacent Tularosa Basin and Hueco Bolson. In this regard, it is useful to review first the results of the Santa Teresa Survey. To recapitulate briefly, the field survey activity achieved several objectives. Of the total survey area of 22.07 square kilometers, 13 percent was investigated at the finest level of detail, combining the 100-meter transect-density distributional approach with a traditional record of sites, isolated manifestations, and isolated artifacts. An additional 50 percent (including all of the remaining area of Zones 1 and 2, and 30 percent of Zone 3) was surveyed using a traditional approach, plus artifact counts for many 100-square-meter units, so that about 87 percent of the total project area is amenable to quantitative activity analysis. Sixty-eight formally defined sites were recorded, and 198 isolated manifestations were noted and mapped.

Site density for the project area was 3.08 per square kilometer. This occupational density is slightly lower than, but in line with, that recorded by Carmichael (1982a) for Group I sites in the Tularosa Basin (5.3 per square kilometer) and by Whalen (1979) for the Hueco Bolson (7.1 per square kilometer). However, this relationship should be examined. Carmichael reports a second class (Group II) of simpler sites for which field forms were not made, so that together Group I and Group II sites yield a density of 13.7 sites per square kilometer. These Group II sites may (or may not) be similar to the Isolated Manifestations (IMs) recorded at Santa Teresa. The combination of Santa Teresa sites plus IMs yields a density of 12.05 per square kilometer, very similar to total density in the Tularosa survey. It is notable that Skelton and others (1981), using a somewhat more restrictive site definition, recorded a density of 2.06 sites per square kilometers for the same area of the Tularosa Basin where Carmichael found 5.3 per square kilometer. The impact of this level of uncertainty and/or inconsistency in interpretations of regional settlement patterns and population estimates is obvious.

In addition, direct comparisons with other relevant areas are complicated by the very different kind of socioeconomic phenomena apparently represented. All of the sites recognized at Santa Teresa evidently reflect brief camping plus foraging activities. Missing are the residential pit house and above ground village sites so important to the record in the Tularosa Basin and Hueco Bolson (for example, Lehmer 1948; LeBlanc and Whalen 1980; Whalen 1977, 1978, 1981; O'Laughlin 1979, 1980; Beckes 1977; Pigott 1978; Carmichael 1981a, 1981b, 1982). However, such sites undoubtedly exist in the general vicinity and several El Paso period villages are known along the Rio Grande escarpment immediately to the east of the study area (Scarborough 1983). Other specialized procurement or processing locations, such as agave roasting middens or lithic quarries, are likewise absent. Elsewhere in south-central New Mexico and west Texas they are a prominent part of the record (for example, O'Laughlin 1980, Whalen 1978, 1981; Carmichael 1982a).

Before considering the relation of this record to adjacent regions, it is worth noting that in the Santa Teresa study area, as elsewhere in the area, dating of surface materials is still a chronic and critical unsolved problem. In the present research, dating was based on (1) the presence of temporal diagnostics (primarily projectile points and ceramics); (2) Carbon-14 dates; and (3) obsidian hydration dates (see Chapter 6). After some investigation, it was decided that Carmichael's (1982a) Lithic Diversity Index could not be effectively used because the primary correlate of lithic (or any other artifact) diversity was found to be sample size rather than chronology (Kintigh 1984). Ultimately, however, profiled proportions of changing material use through time may be important in temporal placement of surface sites.

The 68 sites recorded include 29 that can be approximately dated to period(s) of occupation (see Figs. 12.1 through 12.5). These represent 39 components as follows: 1 Paleo-Indian (2 percent); 12 Archaic (29 percent); 19 Mesilla (48 percent); and El Paso (18 percent). Dona Ana phase materials could not be reliably distinguished from El Paso. These proportions are generally similar to those found in the Tularosa Basin, except that Mesilla remains are somewhat more numerous and Dona Ana-El Paso remains somewhat less numerous (Carmichael 1982a). The absolute decrease in the proportion of El Paso sites may reflect the increasing horticultural focus of the Pueblo period (shifting away from the land of foraging activities represented at Santa Teresa). However, this cannot be reliably demonstrated with this small sample size.

Considerable attention has been paid to the shift in settlement pattern through time in the Hueco Bolson, Tularosa Basin, and Rio Grande Valley (Whalen 1978, 1981; Carmichael 1981, 1982a; Beckes 1977; O'Laughlin 1977). An overall shift of locations in the Archaic and Mesilla phases gives way to a narrower range of horticulturally significant locations in the Pueblo phases. Playas of various sizes evidently play an important, though shifting role in site location.

The Santa Teresa study area offers relatively little large scale environmental diversity (see discussion below). However, there are numerous small depressions (hardly real "playas") ranging from less than 75-meters to somewhat over 500-meters in diameter with a few as much as 5-meters deep. These small basins hold water only briefly and probably did not serve as a significant source of surface water. The proximity of the Rio Grande obviates this as a serious problem. The depressions themselves would probably have provided increased concentrations and greater ranges of wild plant resources, including Cheno-ams and sunflowers as well as the more widely available mesquite, yucca, and edible grasses. All except 3 of the 68 sites recorded lie within 1000-meters of a depression, a distance commonly used in other studies (for example, Carmichael 1982a). However, given the small total area (22.07 square kilometers) and the large number of small depressions (31+), this is to be expected even with a random distribution. Accordingly, the impact of the depressions may have been cumulative rather than individual, resulting in increased productivity and stability for the Santa Teresa area and the West Mesa as a whole. The visually apparent association between site location and ridge tops or other view points, often overlooking the depressions, was tested in terms of the more detailed quantitative data available from transects and artifact counts (see Chapter 11 and summary below).

Within this larger pattern, especially given the small sample size, there seem to be no apparent differences in site location between periods. Figures 12.1 through 12.5 provide the essential locational information. In brief, the uniformity of the resource base, redundancy of occupation of many of the sites, and apparent uniformity in tool classes represented in all periods suggest that the nature of exploitation of natural resources in the Santa Teresa study area, did not change greatly since the Archaic. Given the diversity of wild resources and the concentration of plant populations in or near the numerous small depressions, this was evidently a desirable ecological zone for foraging activities at any time period. In spite of the notoriously low artifact productivity of most foraging-temporary camping occupations, the Santa Teresa survey yielded a surprising quantity of materials. However, this in no way supports an interpretation that larger scale regional economic adaptation as a whole remained unchanging through the millenia, or that foraging activities in the Pueblo period represent an alternative economic orientation to horticulture (for example, Upham 1984).

It is necessary to maintain some perspective when considering the significance of remains from contemporary foraging vis a vis sedentary sites. Sedentary villages represent multiple concentrated activities of relatively sizable population units over relatively prolonged periods. They usually produce a large archaeological material culture record in a small space (a "site"). Single foraging localities represent the brief ephemeral activities of a few individuals. They leave a minute archaeological record that is, however, also called a "site." Given the large scale spatial orientation of most cultural resource management research, these geographically repetitive ephemeral foraging localities are grossly overrepresented in the "site record" by comparison to the dense sedentary villages.

In the present instance, the Santa Teresa study area presented a fairly consistent and desirable ecologic zone for foraging activities at any time. There were no environmental opportunities for horticultural development within the study area. However, immediately to the east, adjacent to the rich Rio Grande Valley, there are contemporary El Paso villages that reflect the sedentary aspect of the period. Together they represent the late combination of horticultural intensification with the part time continuation of a very old foraging pattern. This record parallels those seen in the nearby Tularosa Basin and Hueco Bolson (Whalen 1981; Carmichael 1982a).

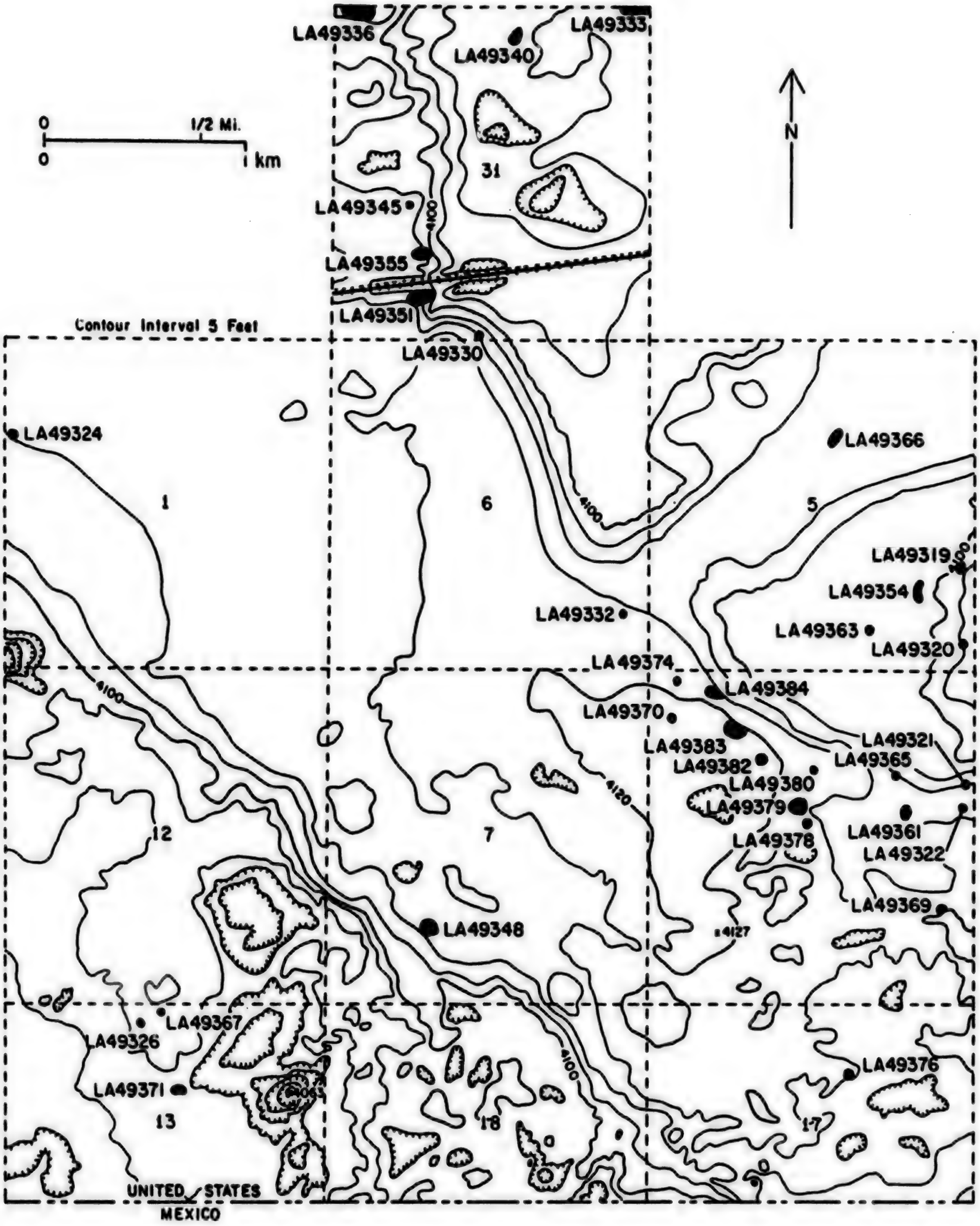


Figure 12.1 Distribution of sites with Archaic period components in the Santa Teresa Study area

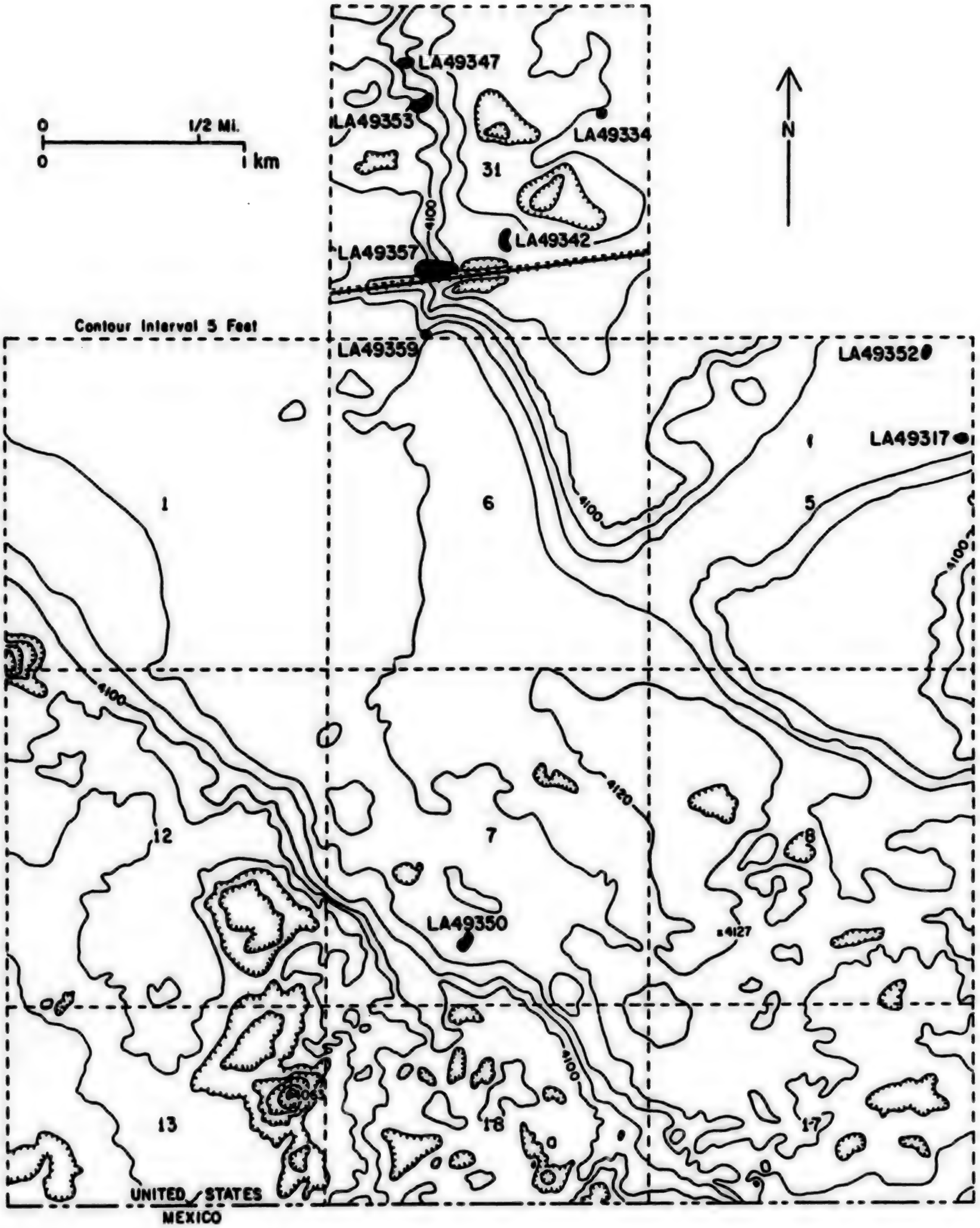


Figure 12.2 Distribution of sites with Mesilla phase components in the Santa Teresa Study area

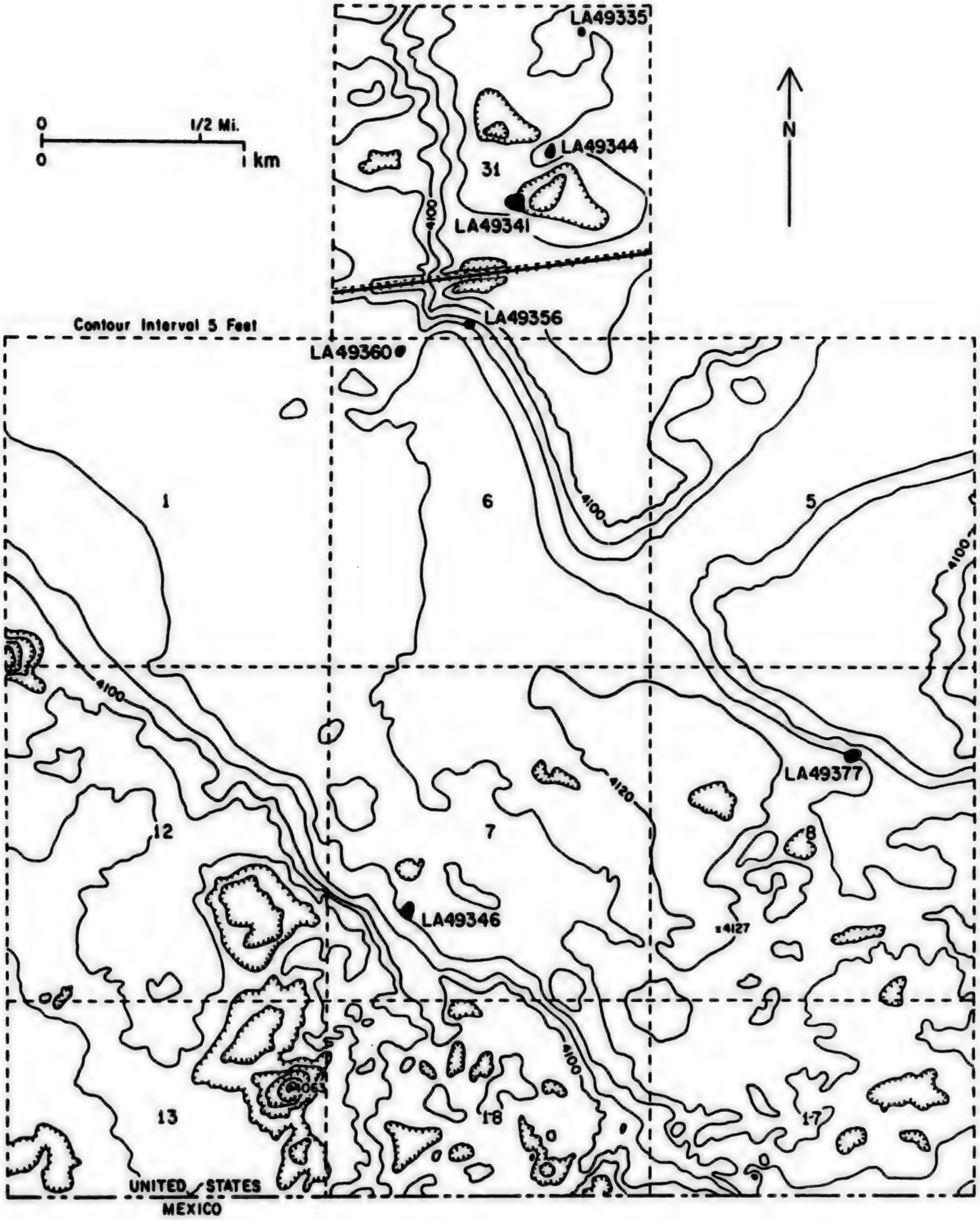


Figure 12.3 Distribution of sites with El Paso phase components in the Santa Teresa Study area

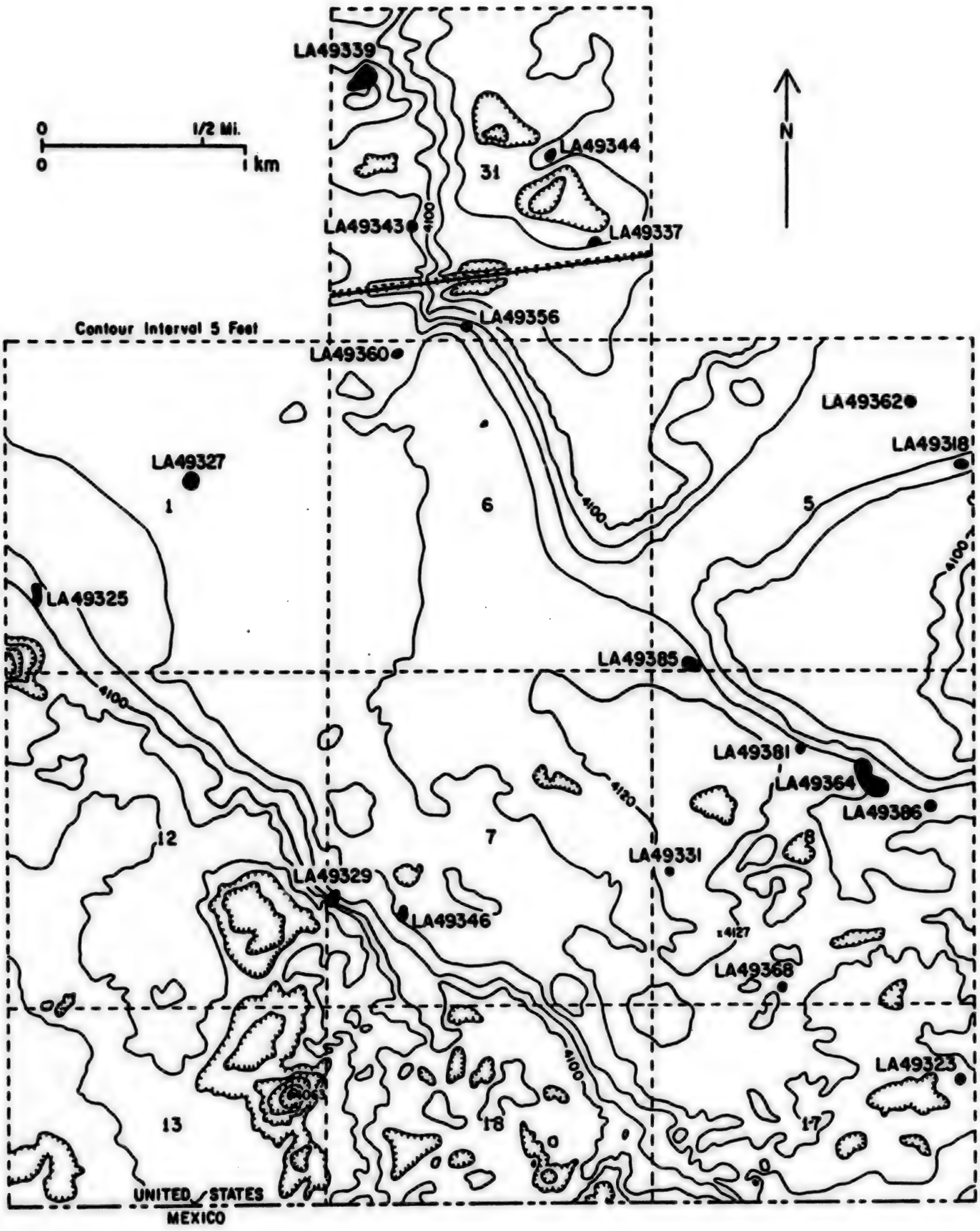


Figure 12.4 Distribution of sites with mixed ceramic components in the Santa Teresa Study area

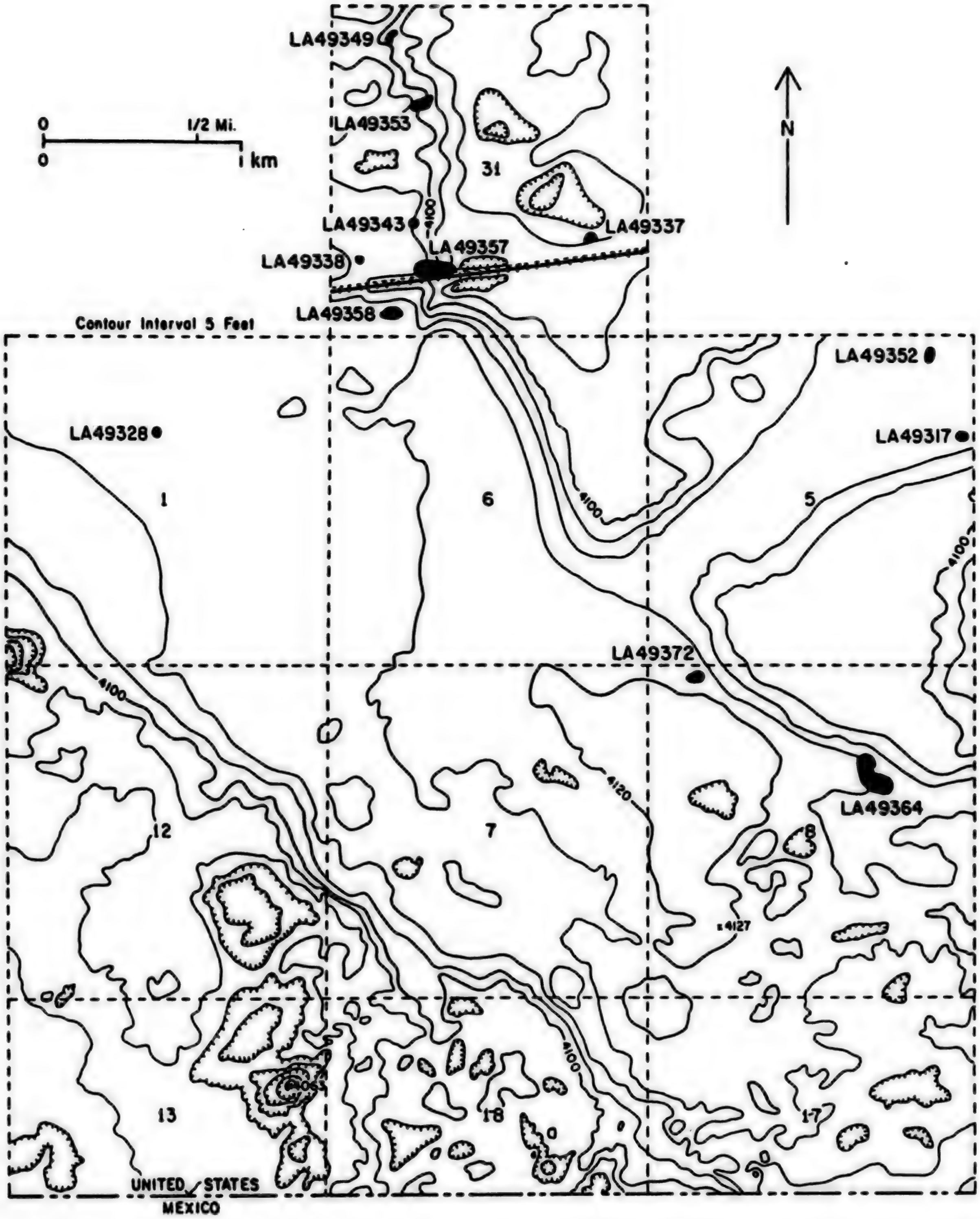


Figure 12.5 Distribution of sites of unknown age in the Santa Teresa Study area

APPENDICES

APPENDIX A

SITE MAPS

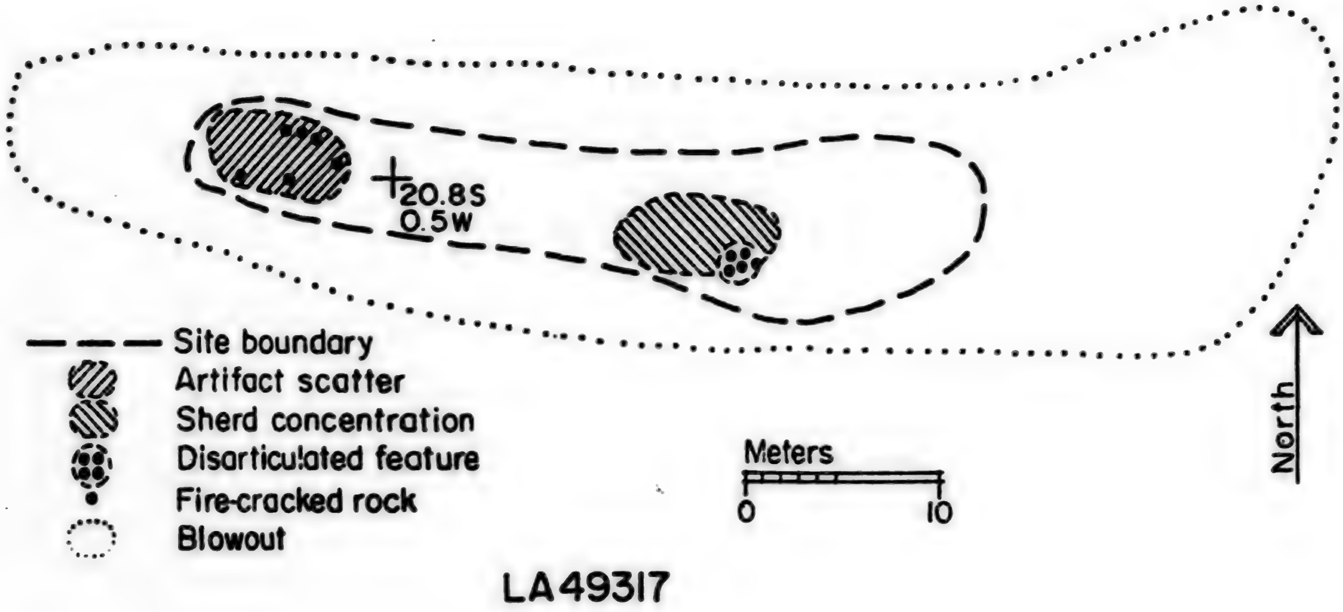


Figure A.1. Site map of LA 49317.

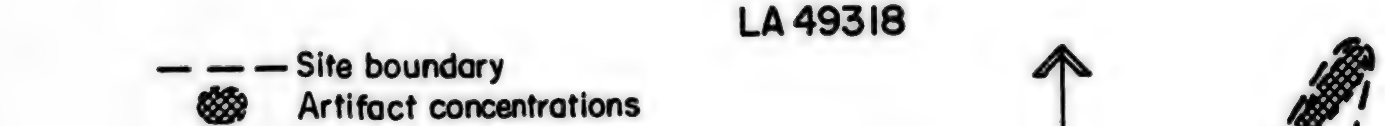


Figure A.2. Site map of LA 49318.

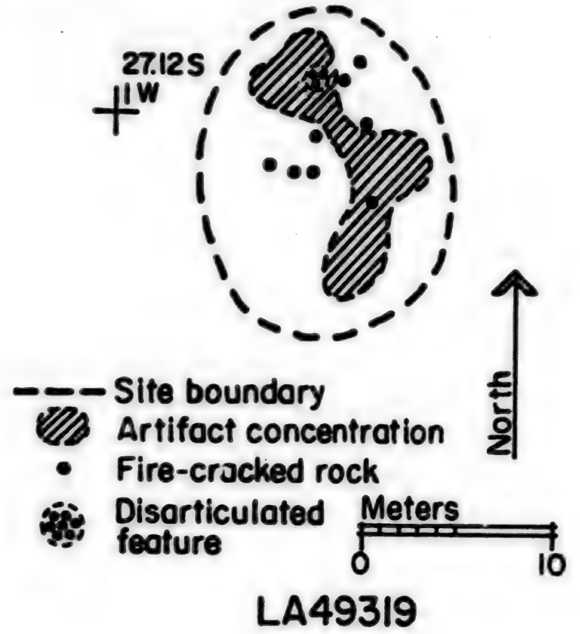
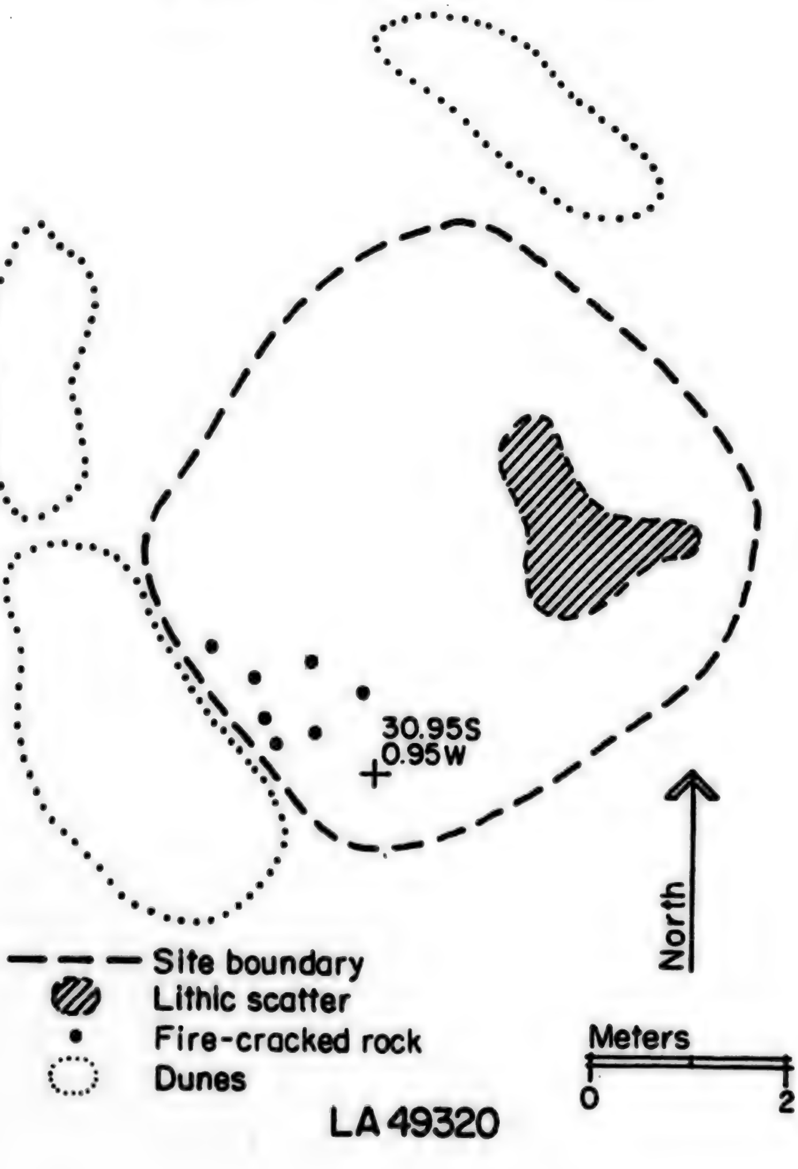


Figure A.3. Site map of LA 49319.



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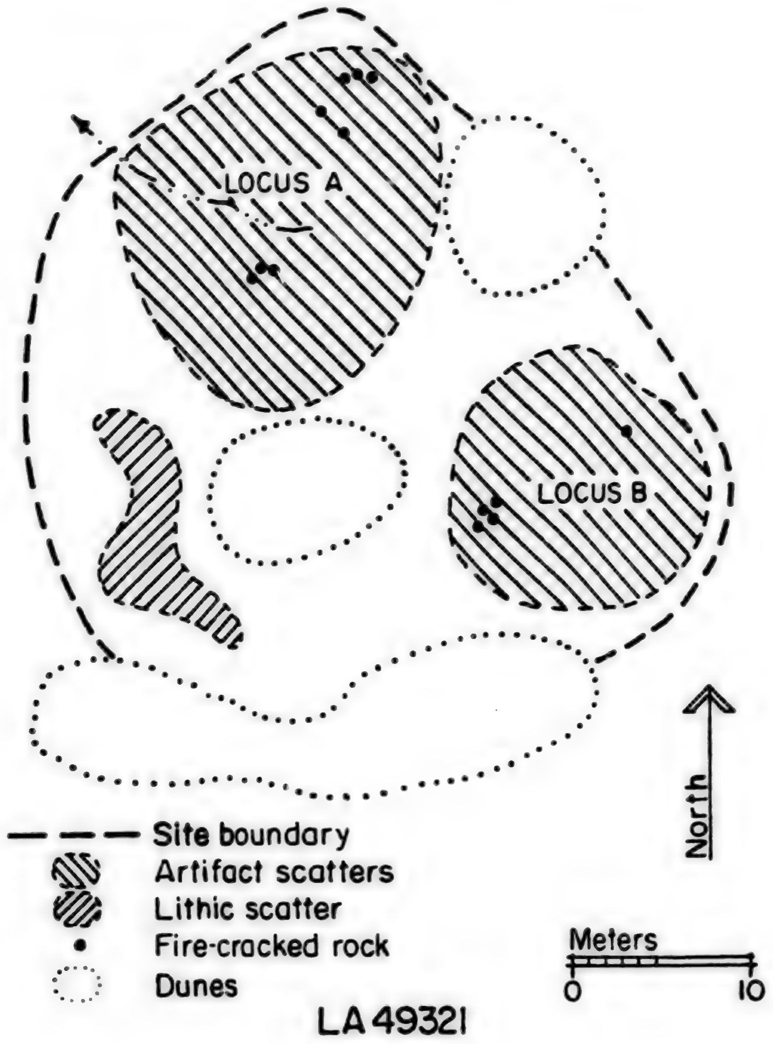

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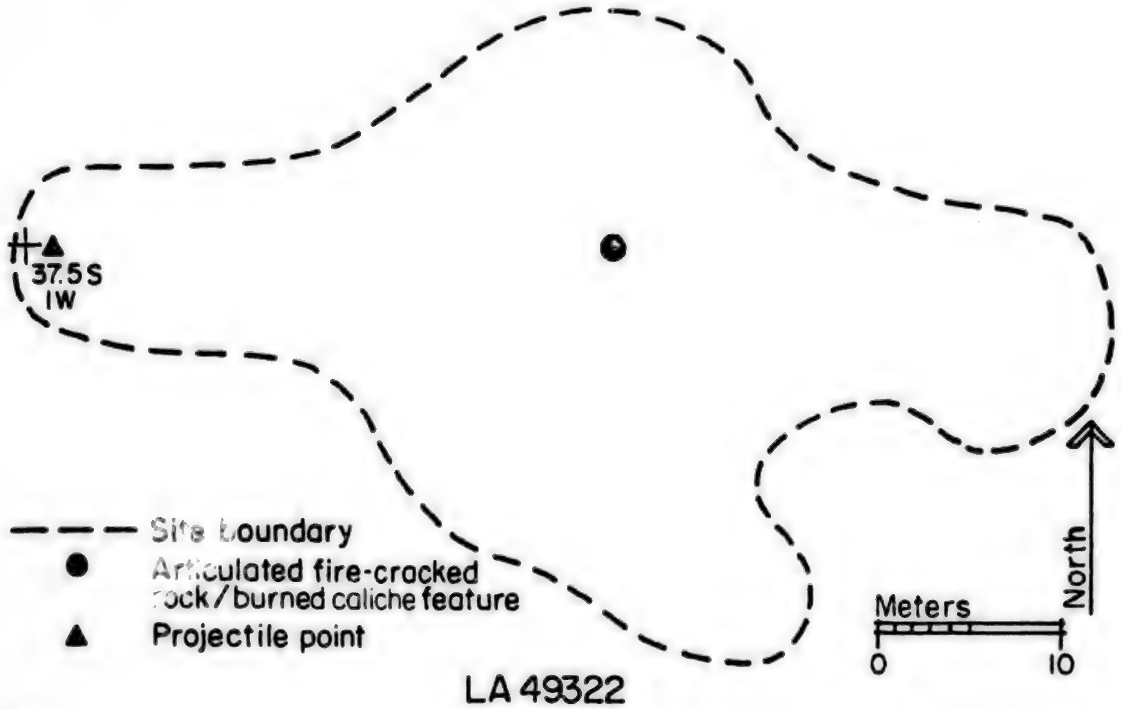

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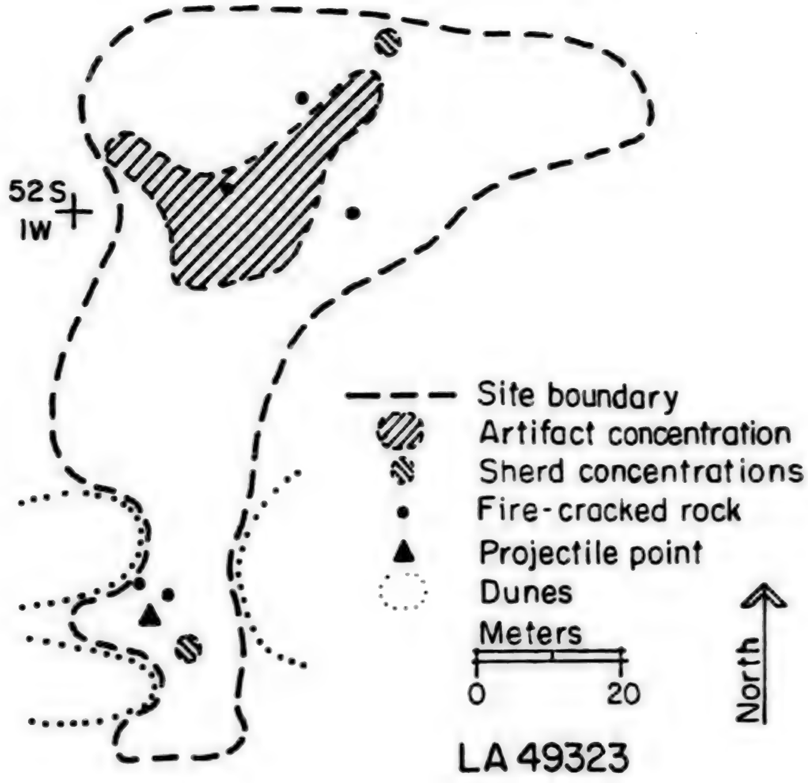

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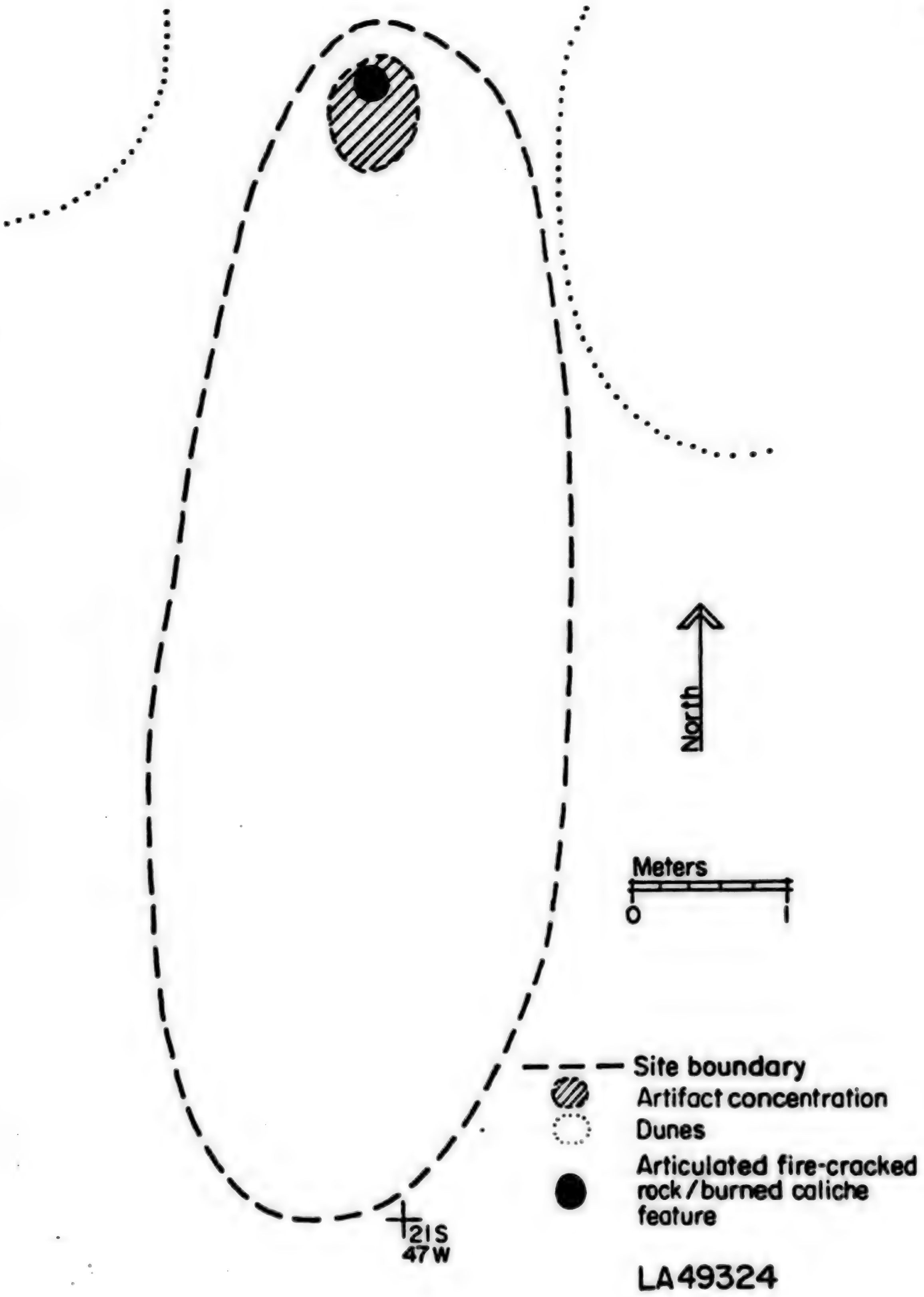

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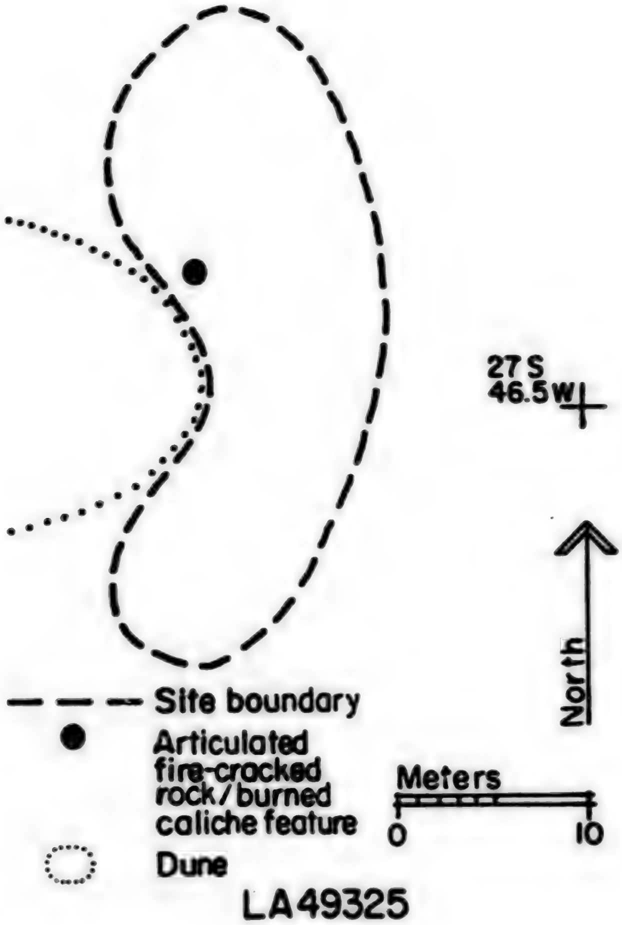

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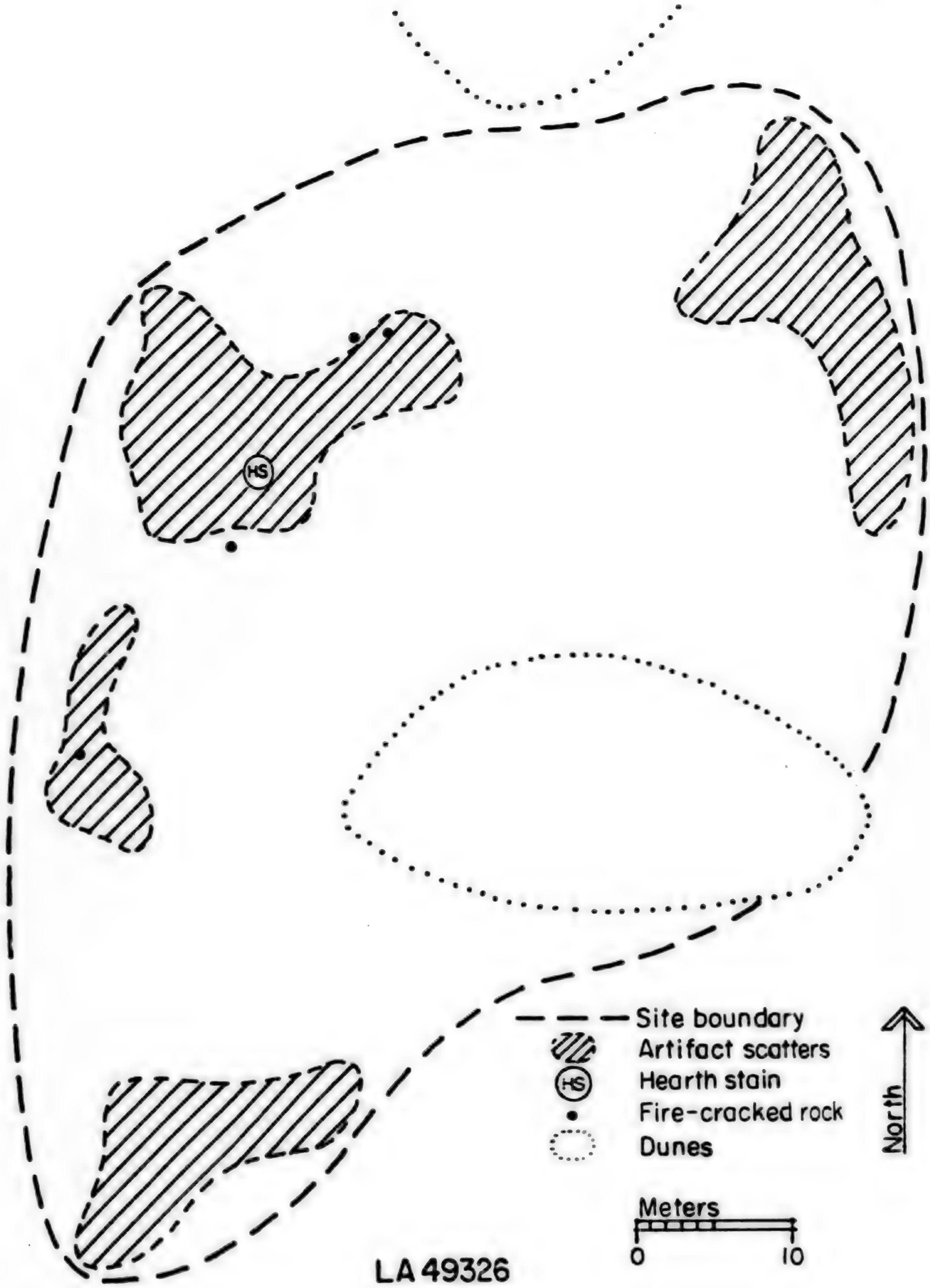

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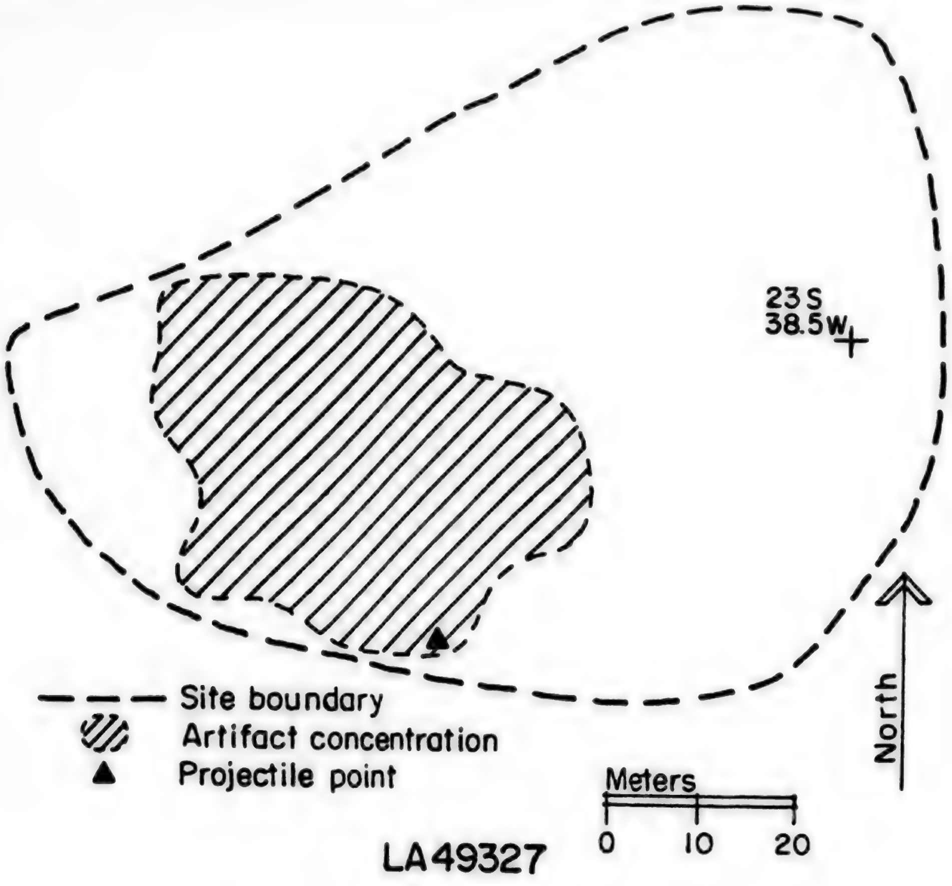

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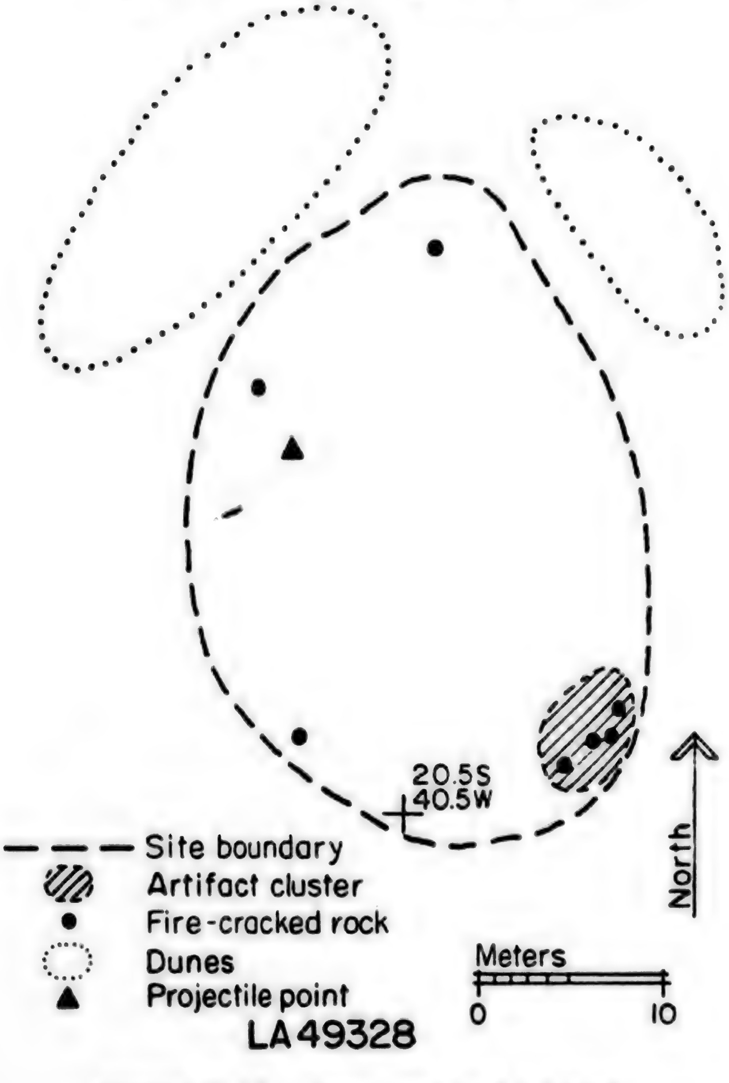

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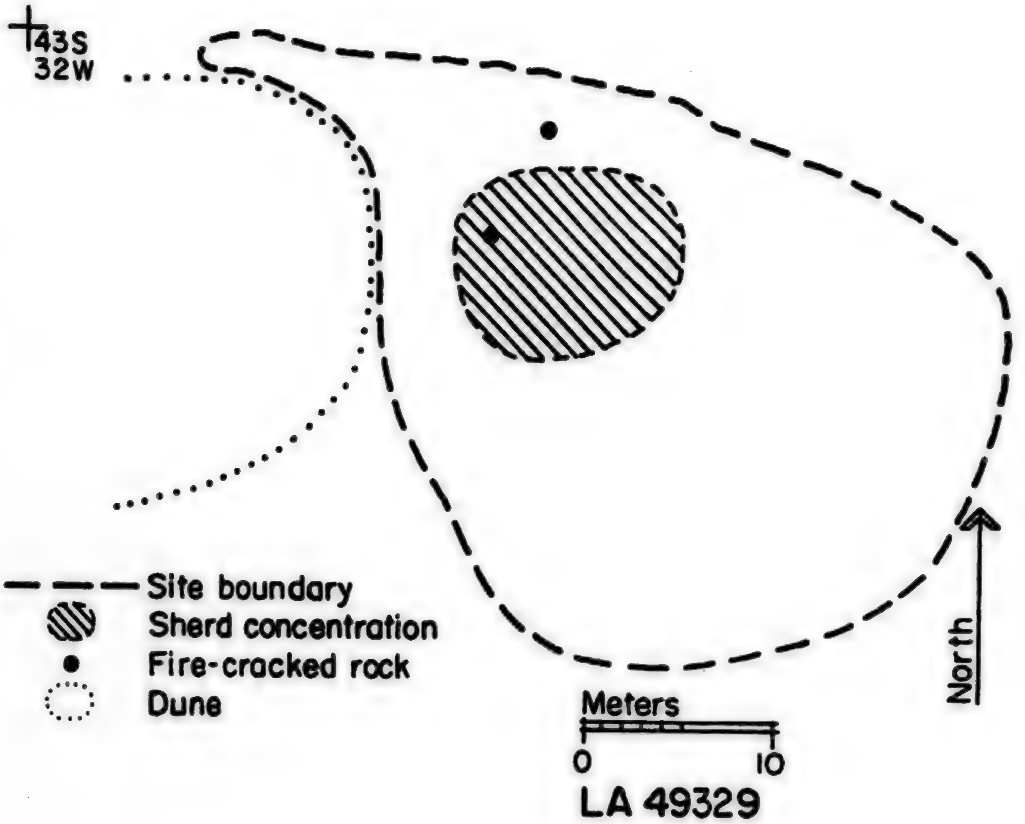

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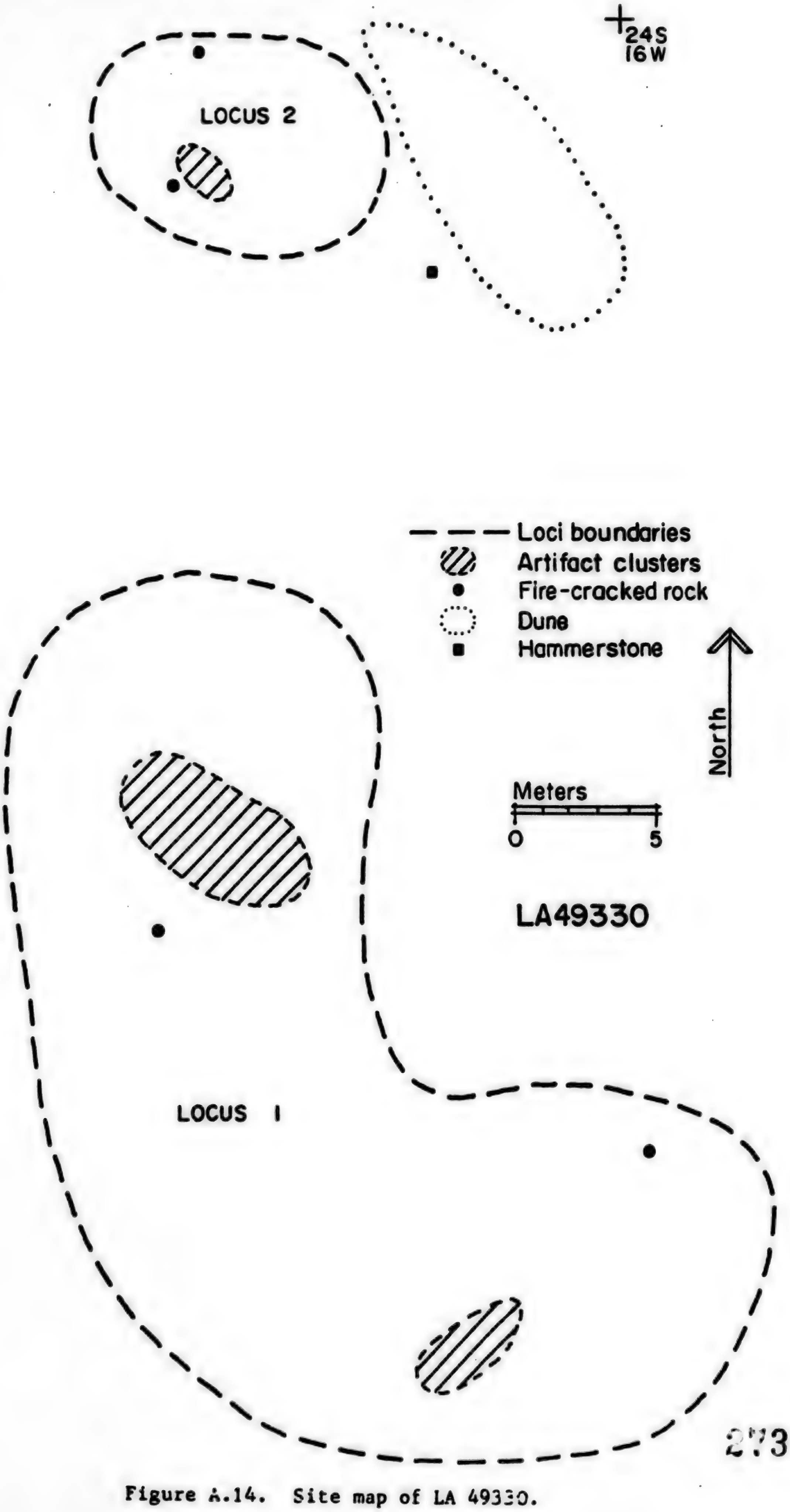
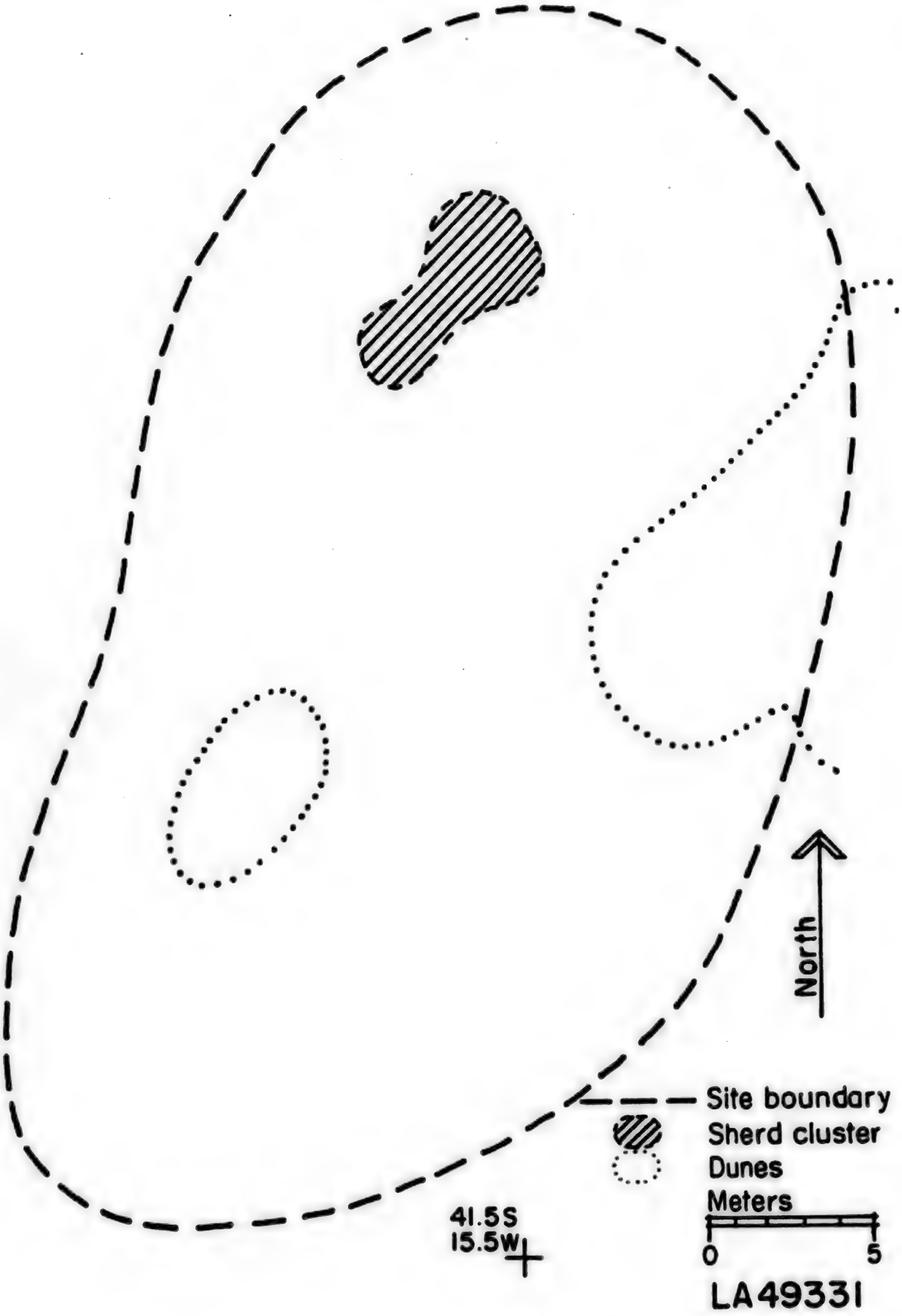


Figure A.14. Site map of LA 49330.



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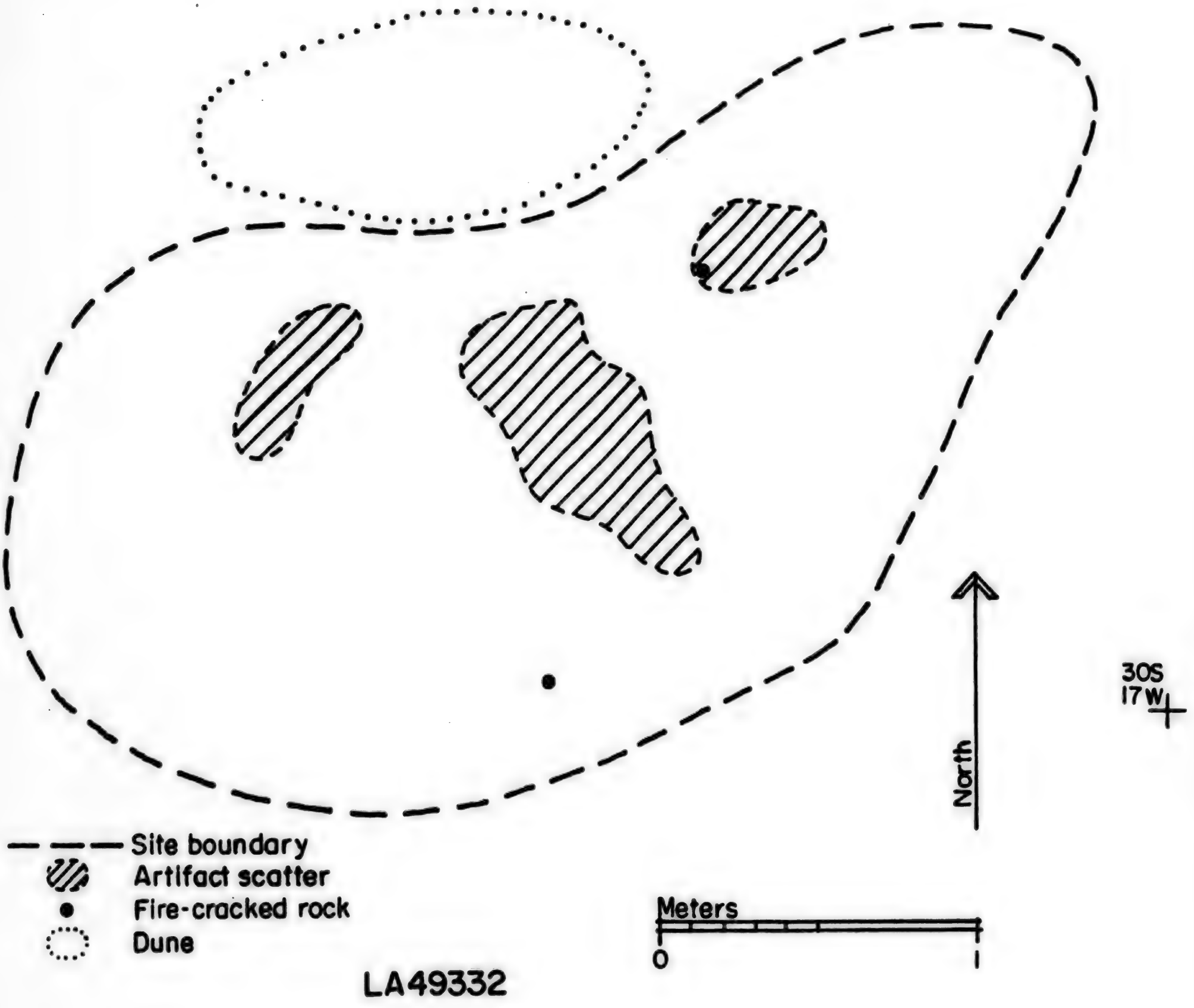

Figure A.16. Site map of LA 49317.

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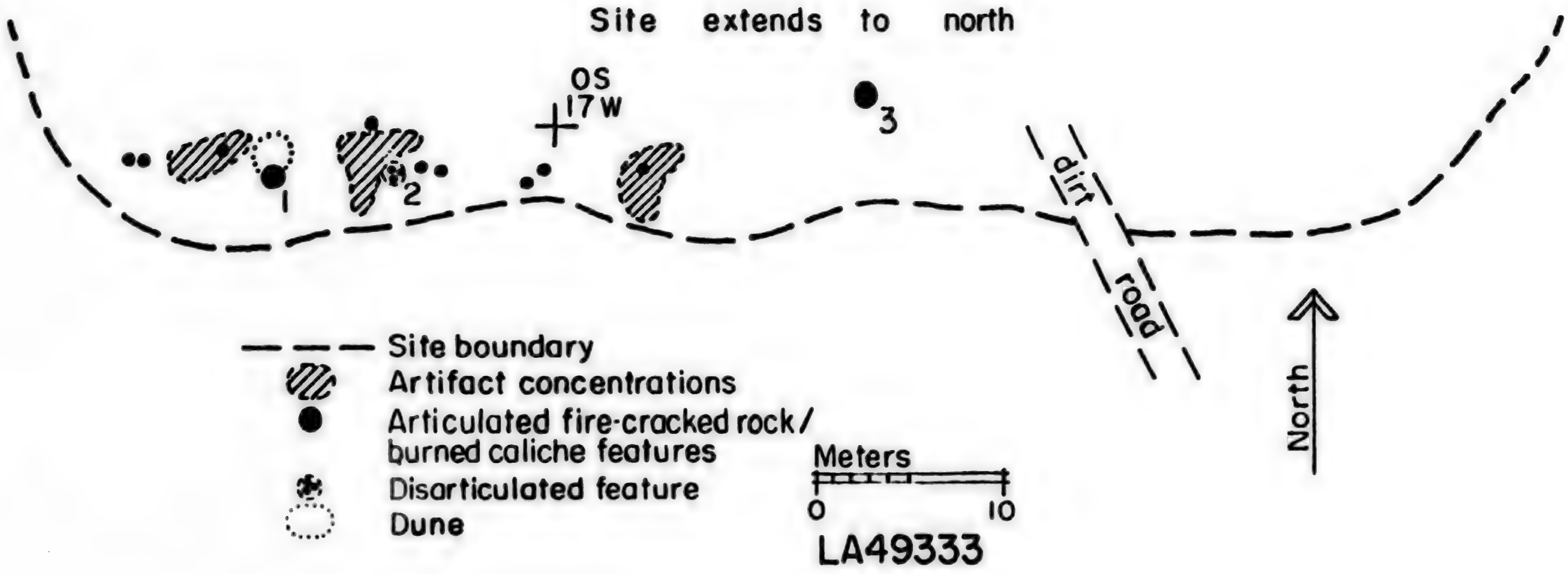

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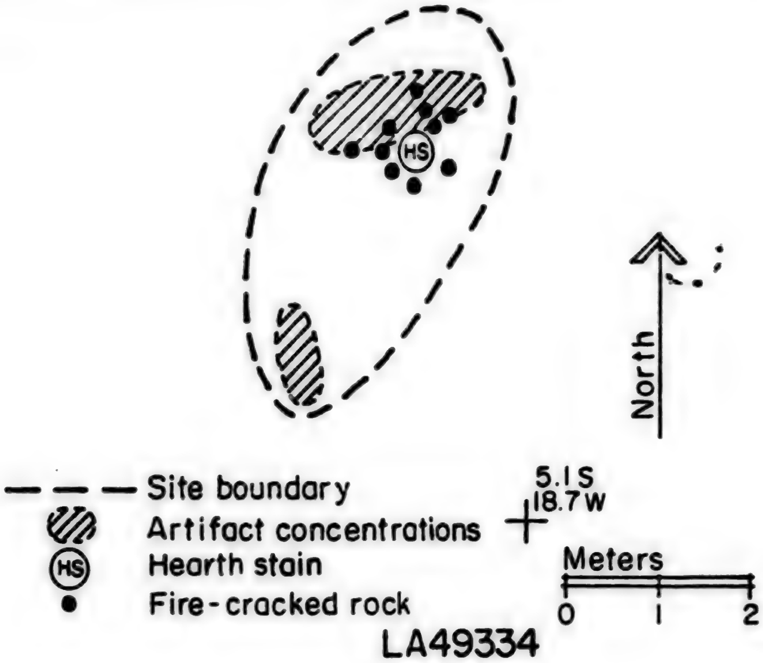

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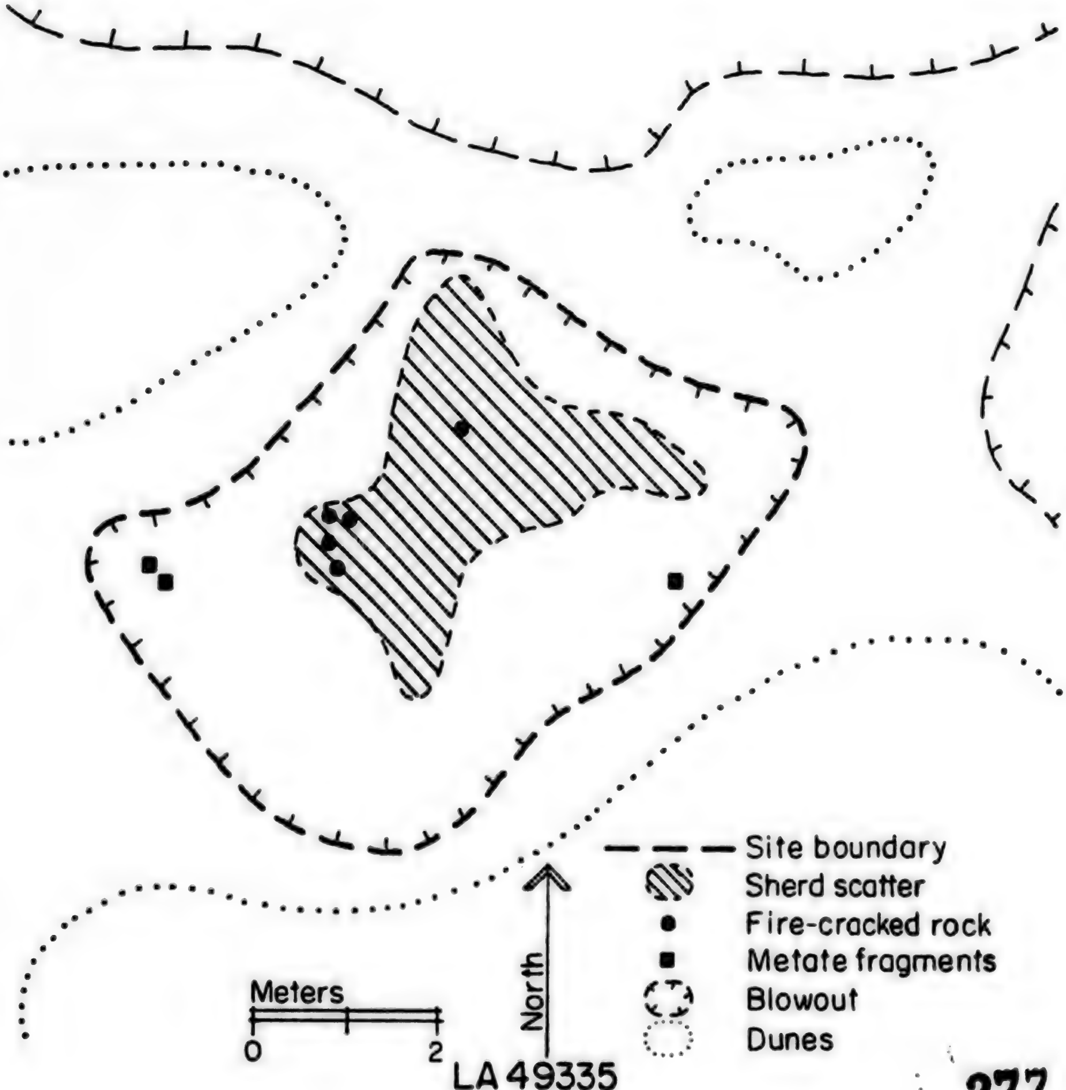

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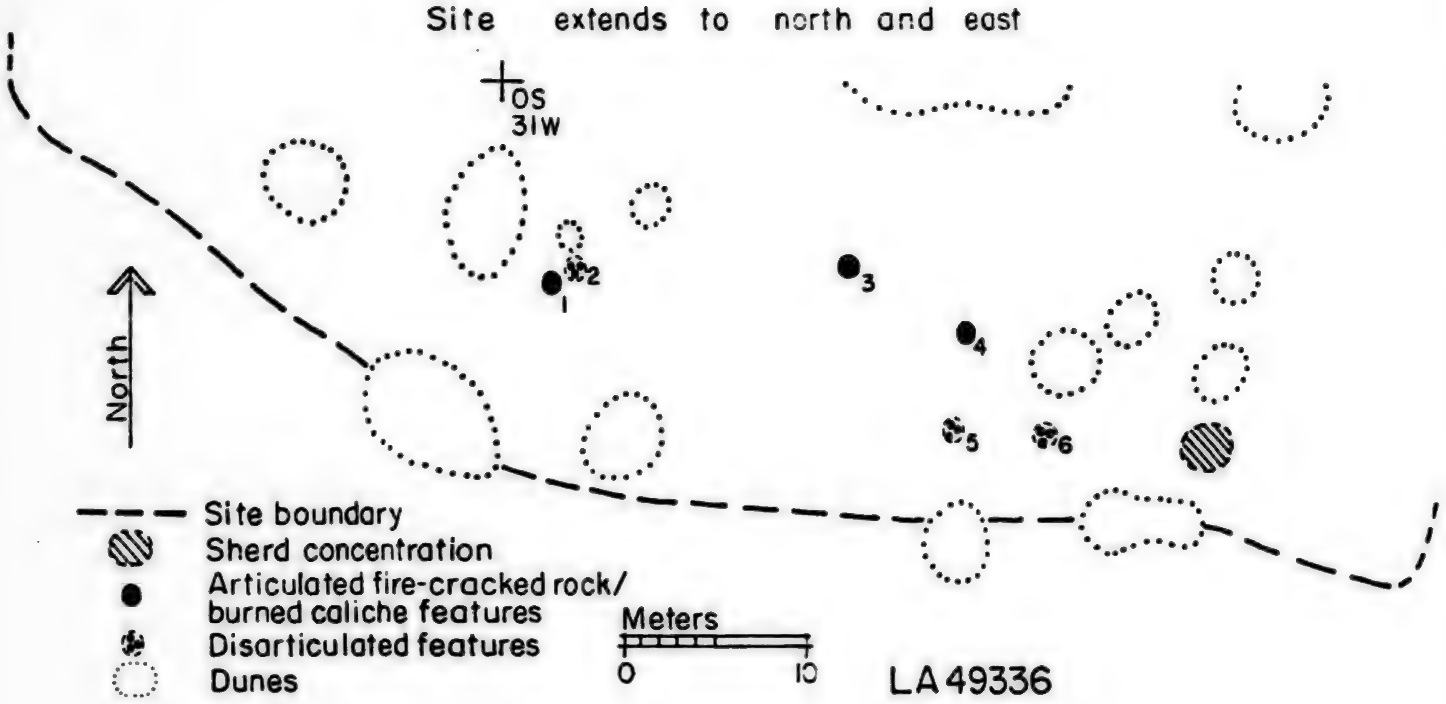

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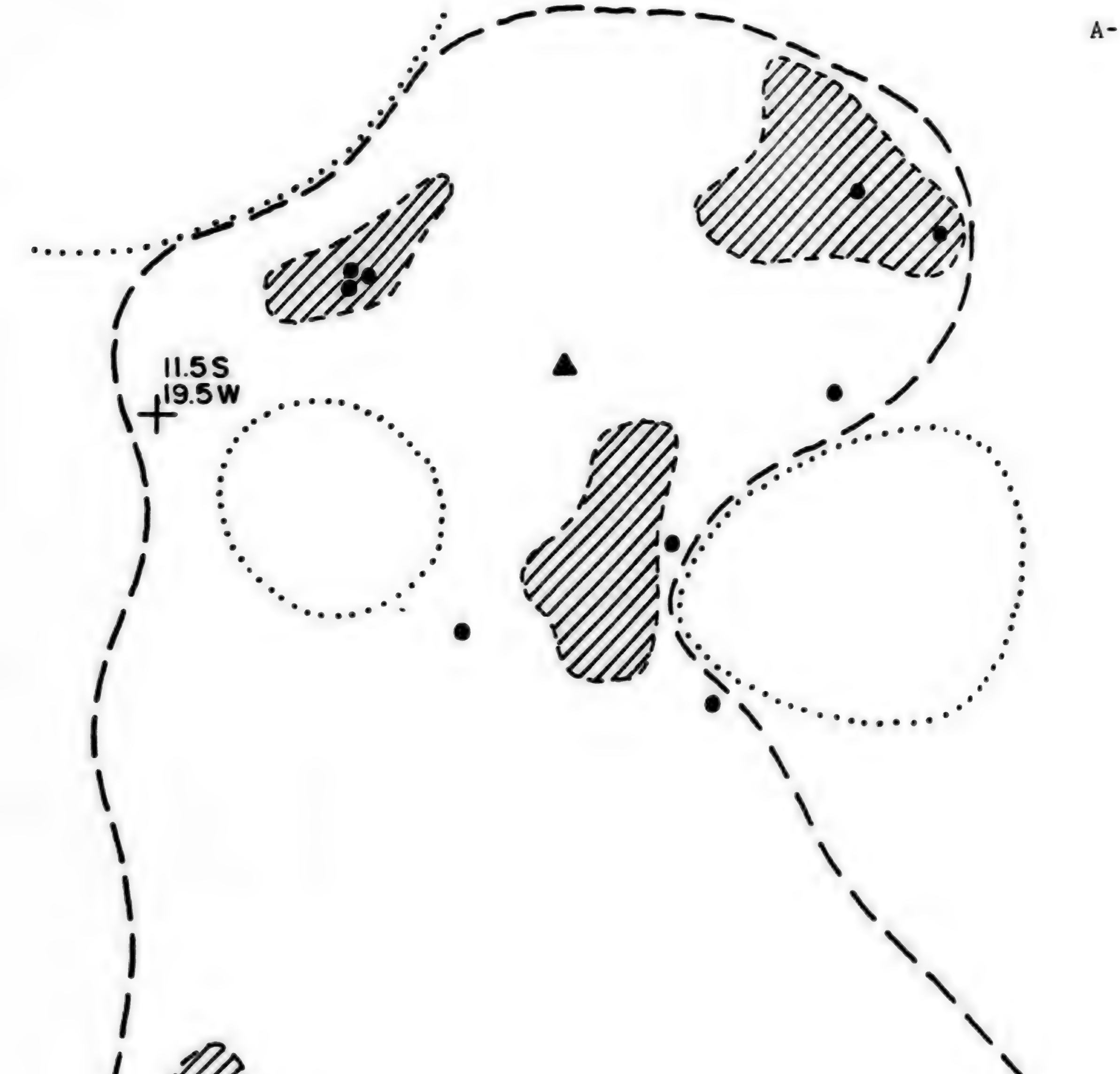

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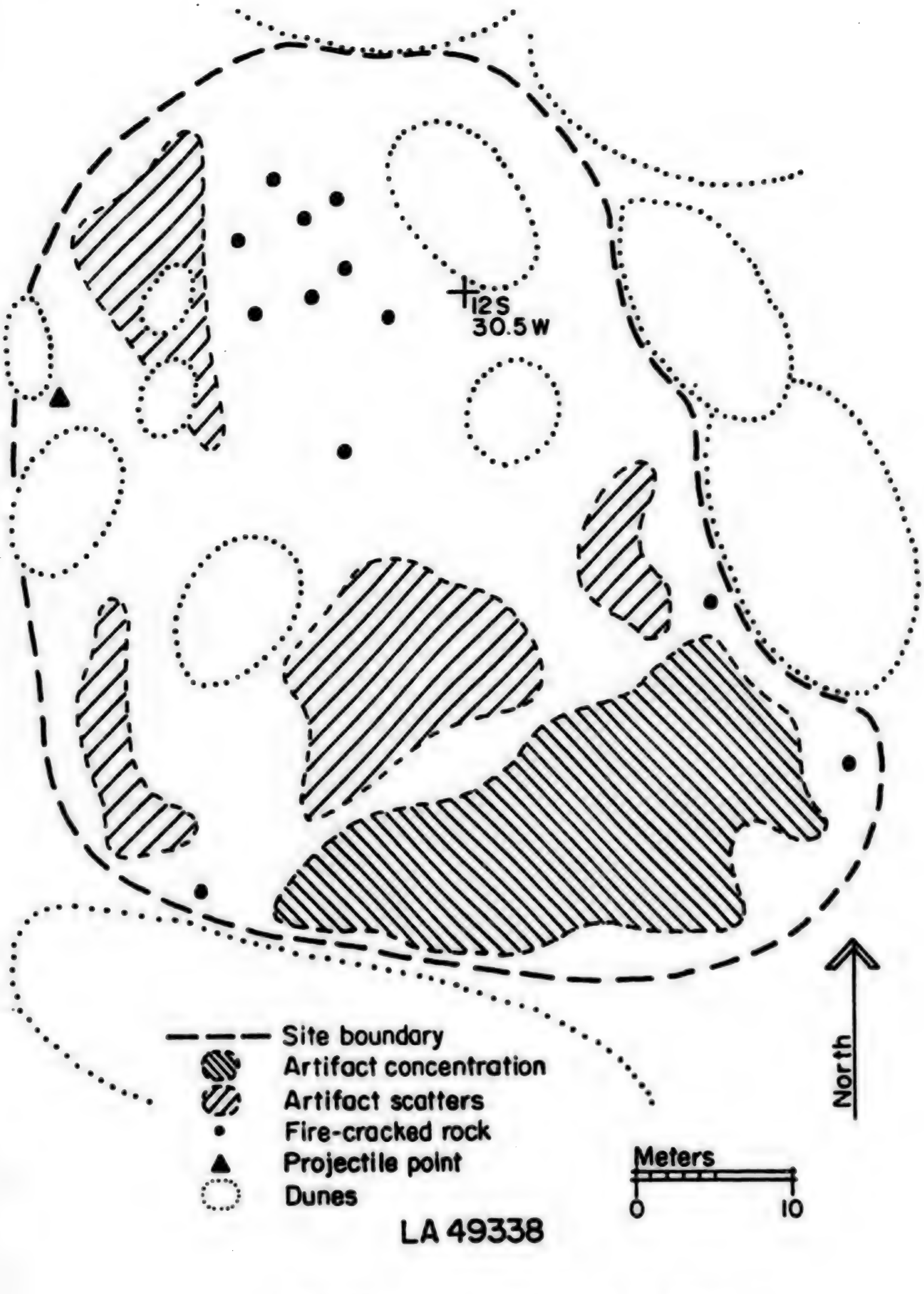

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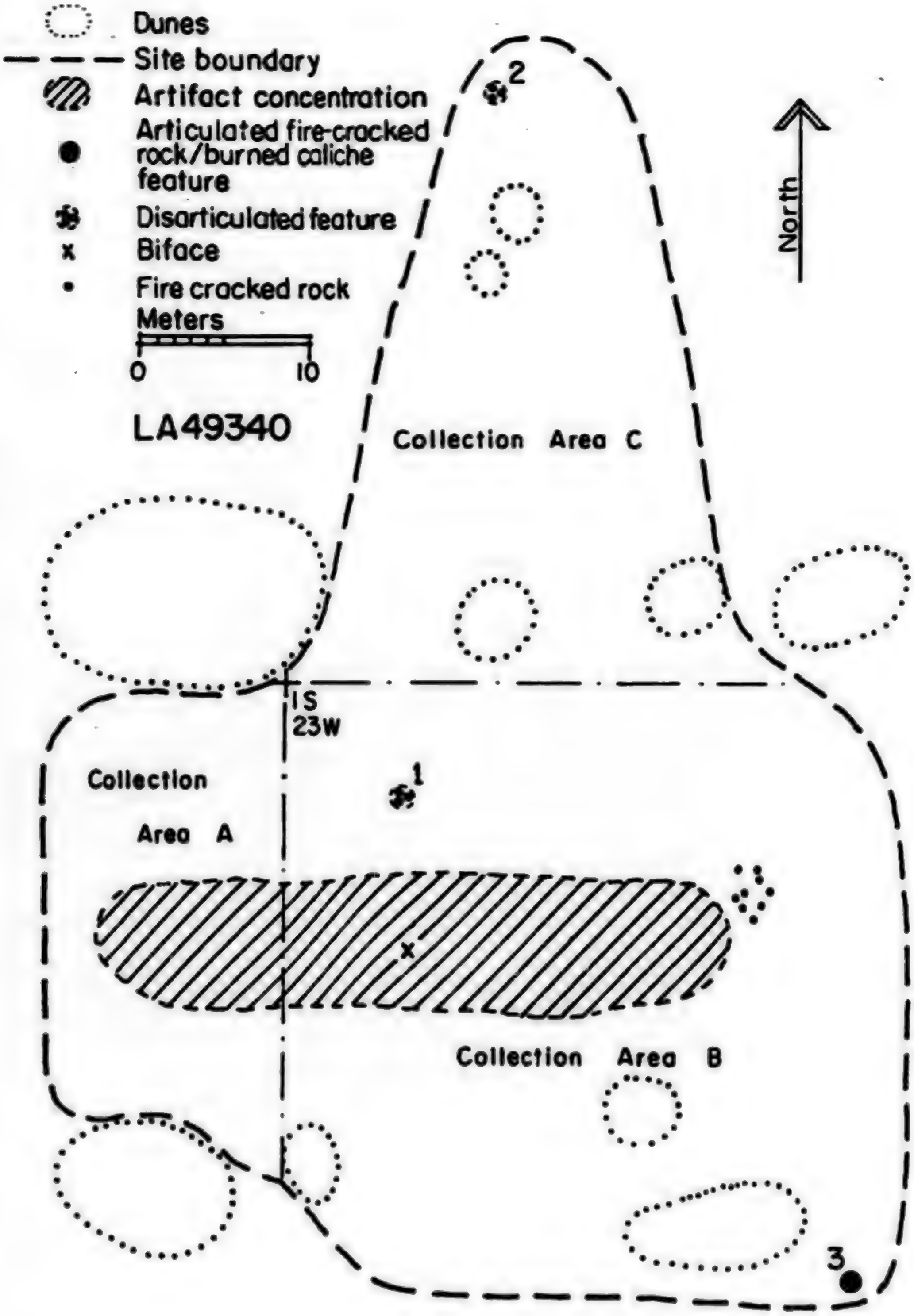

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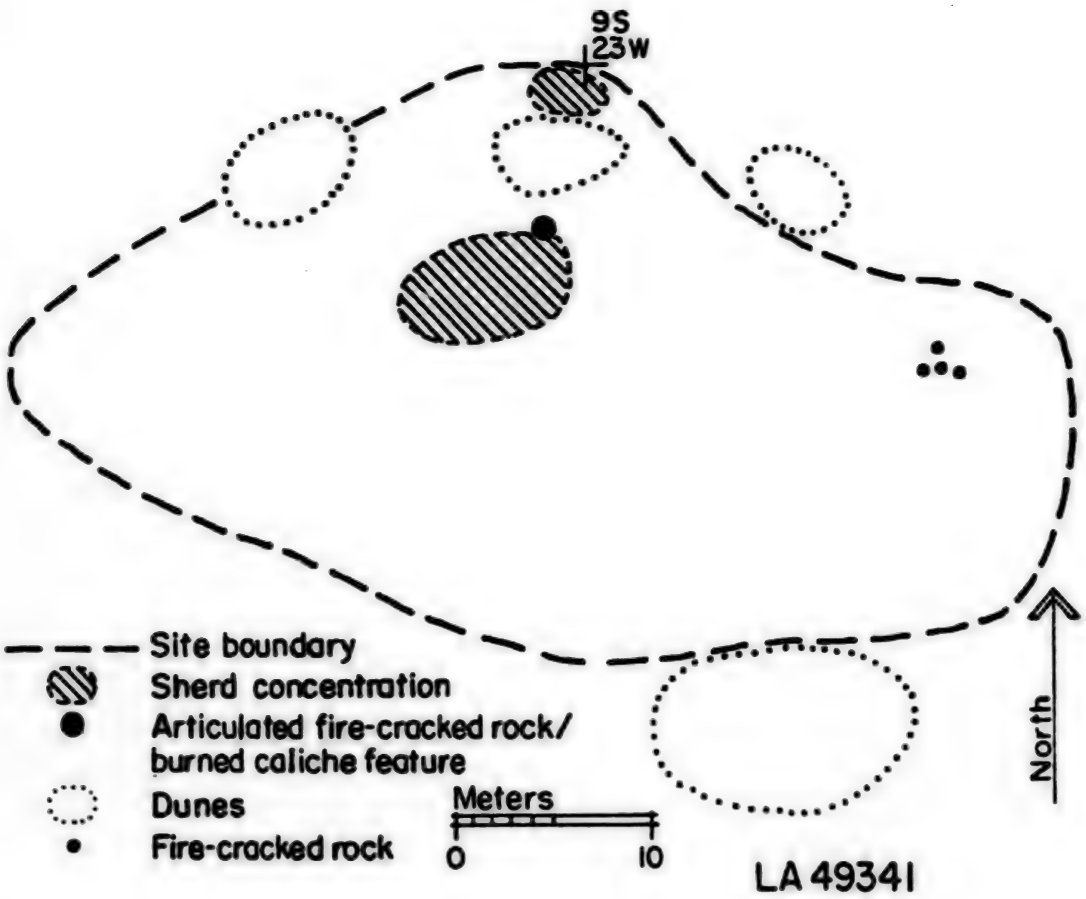

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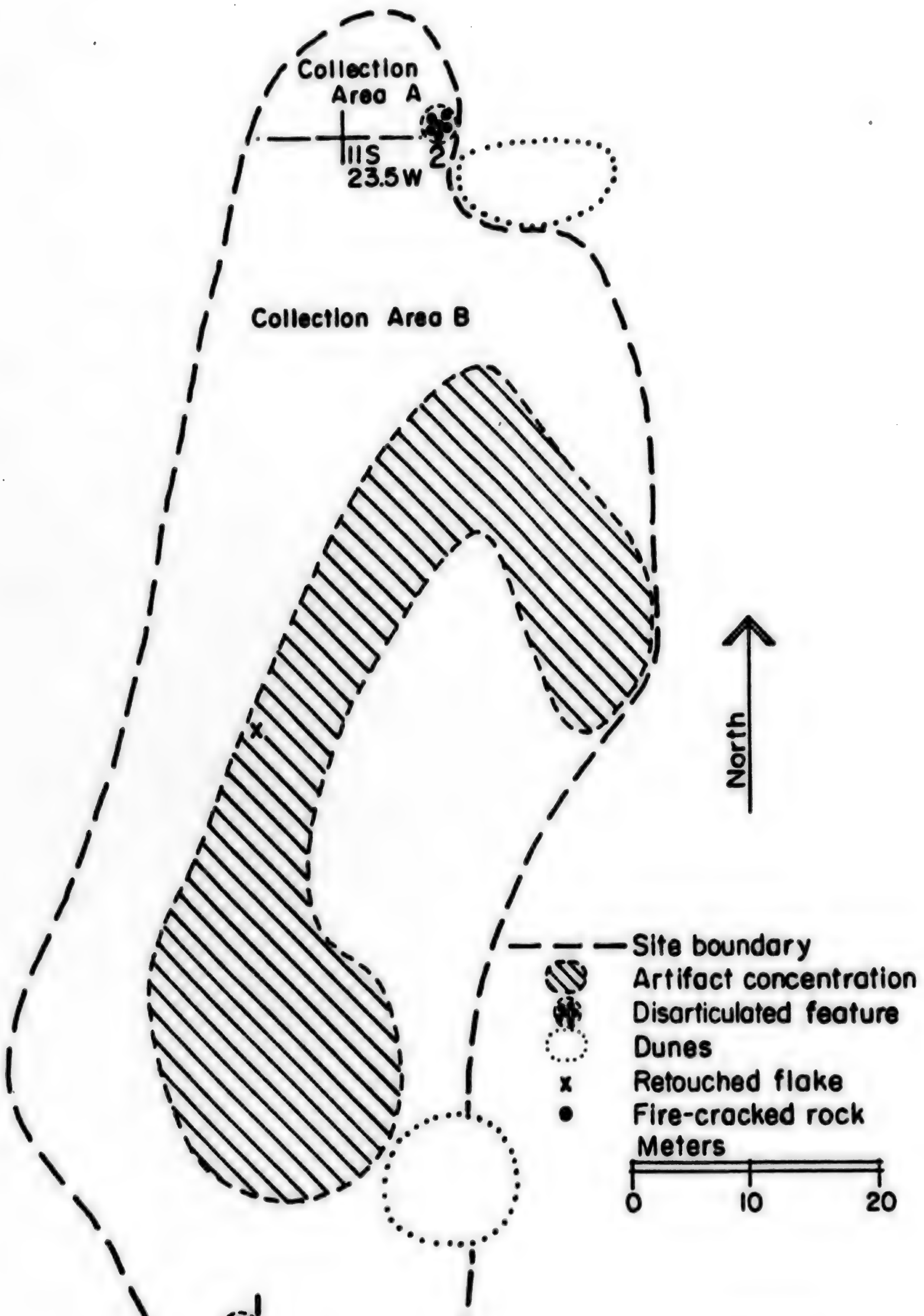

Figure A.26. Site map of LA 49342.

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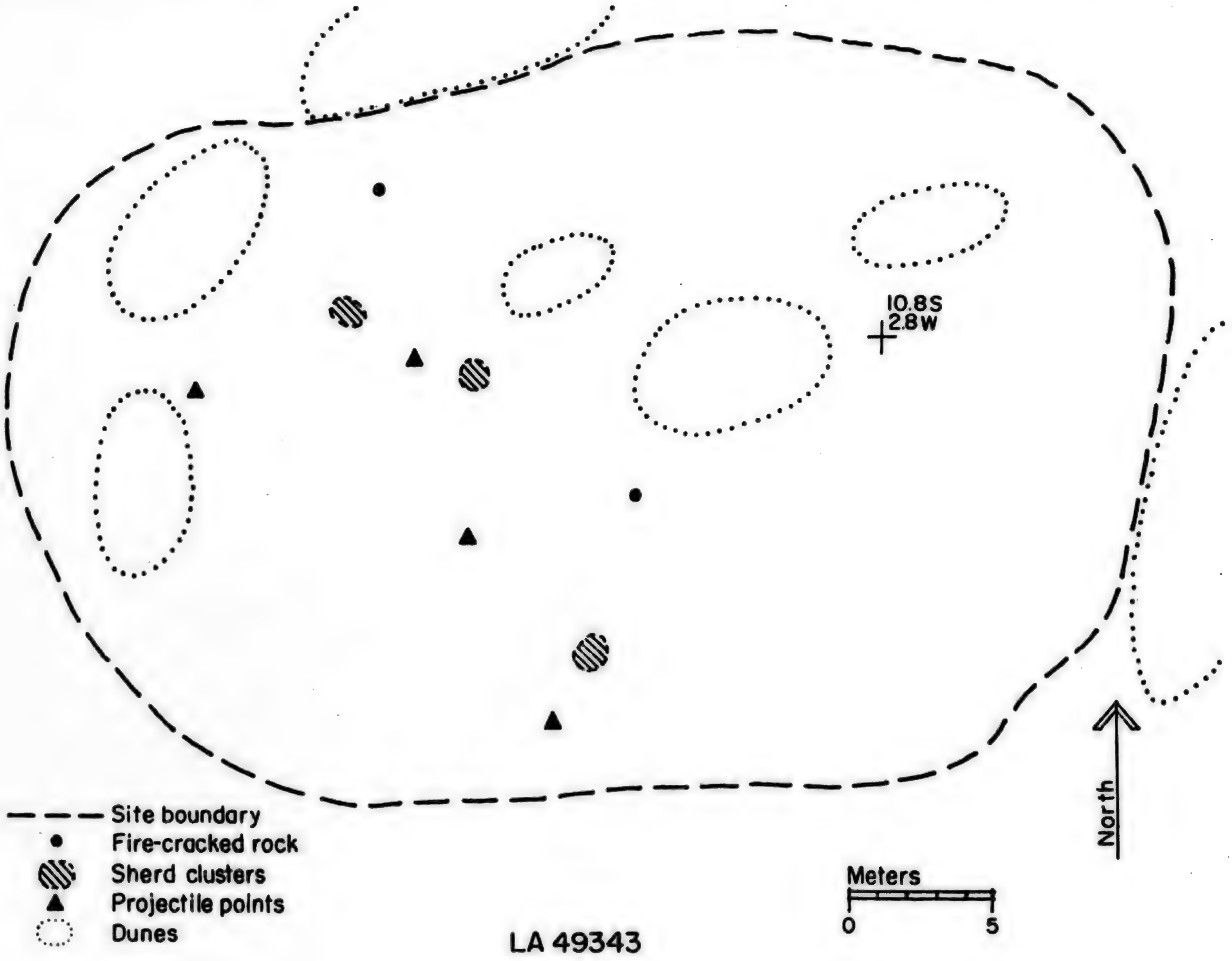

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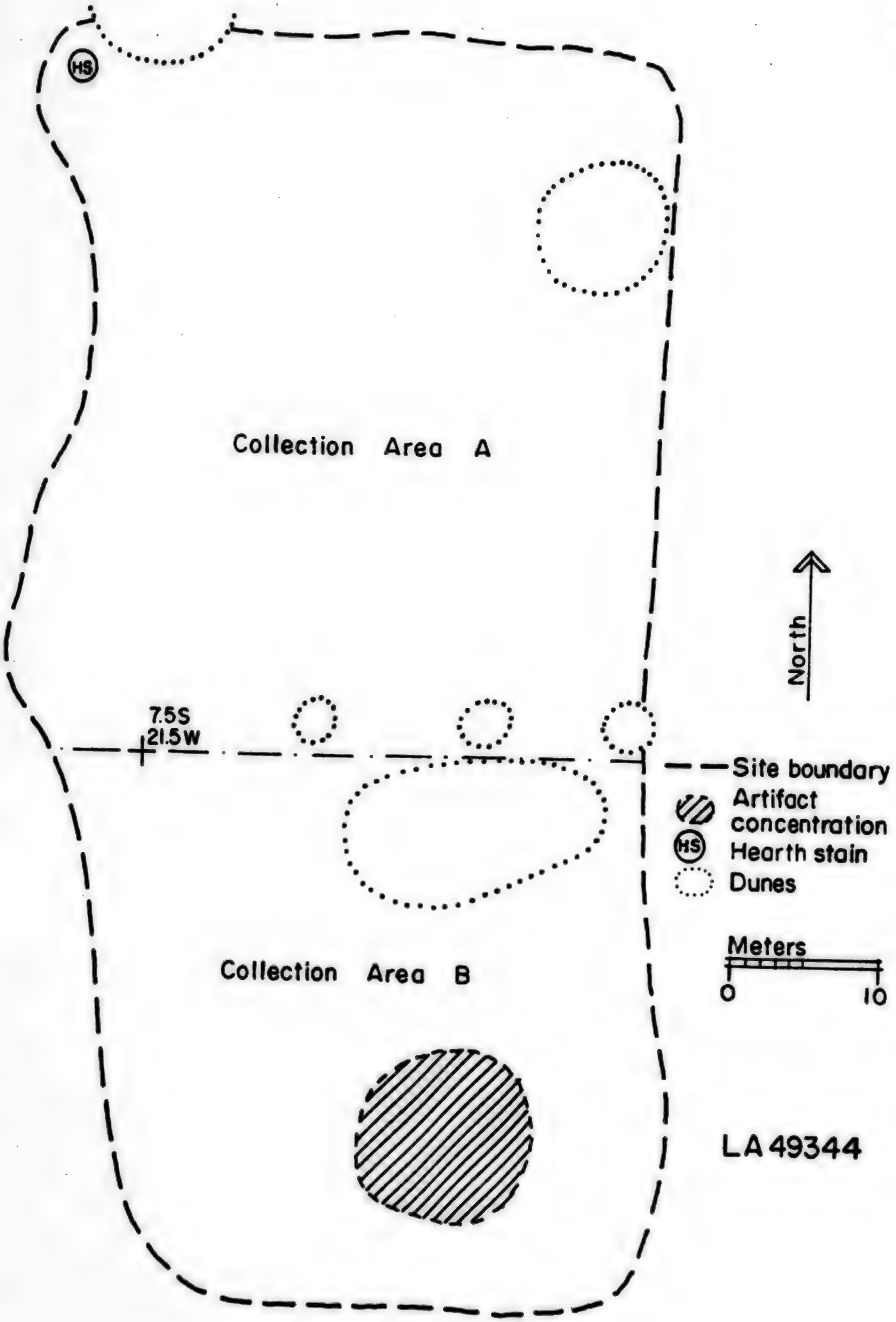

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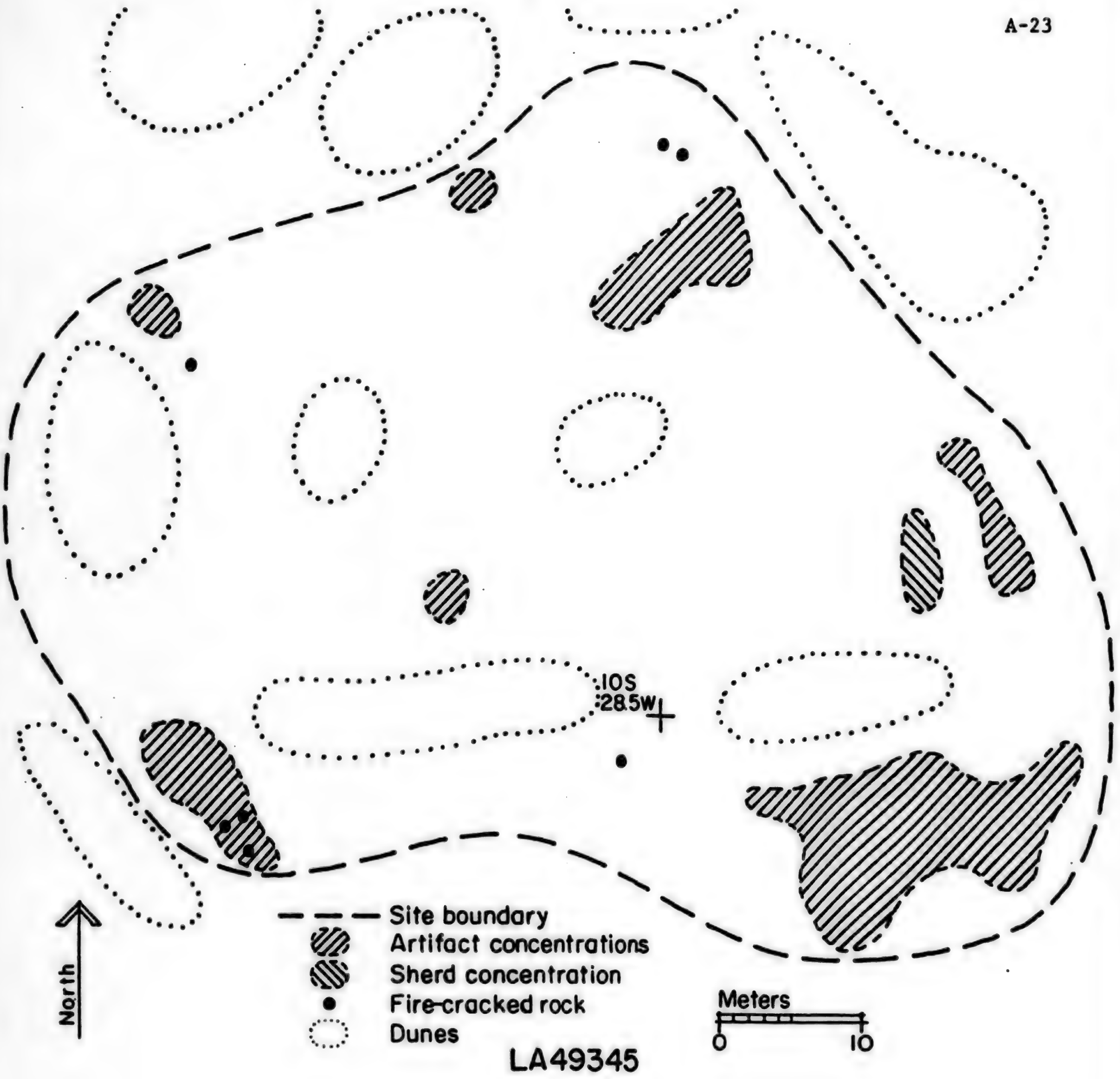

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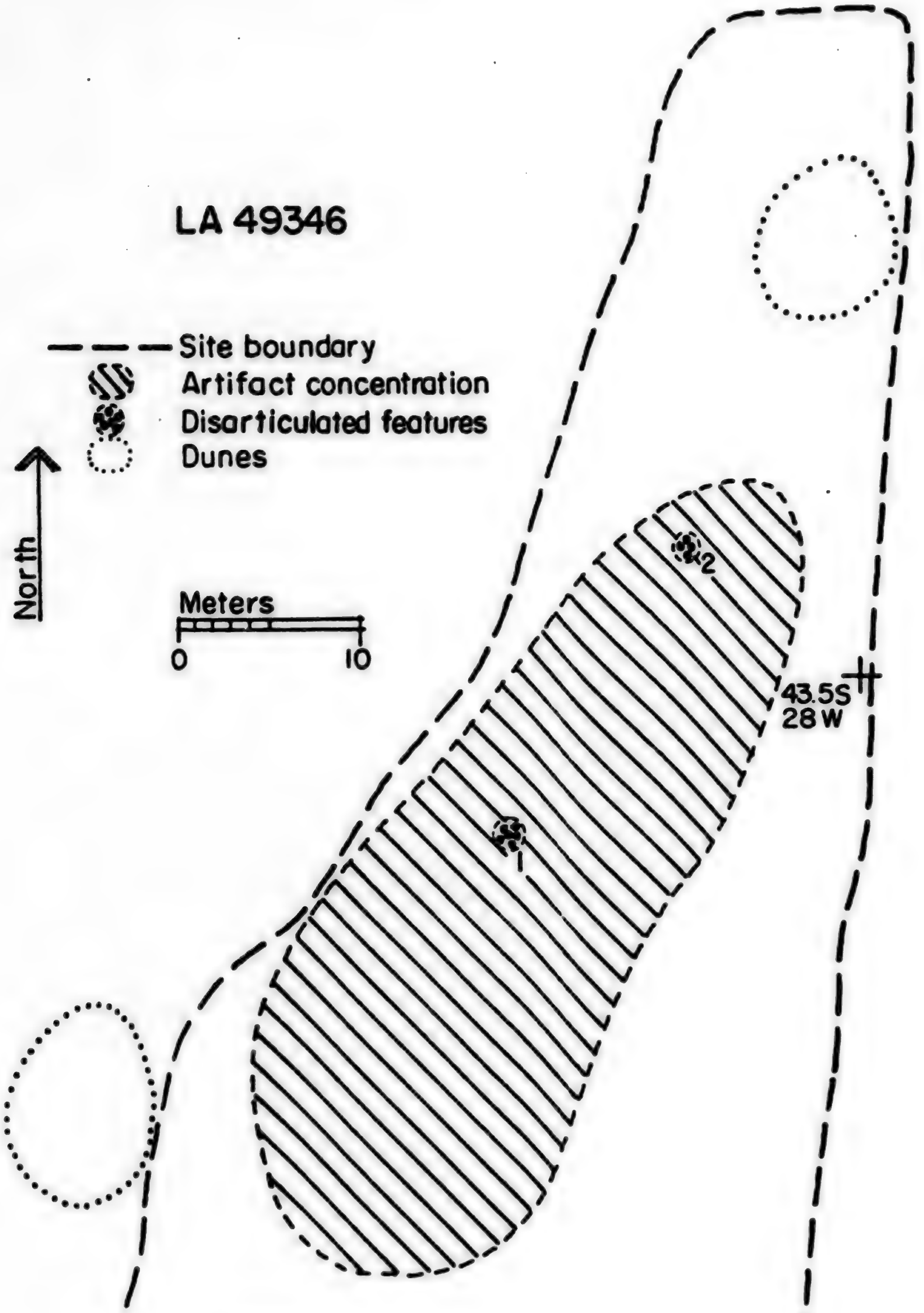

Figure A.30. Site map of LA 49346.

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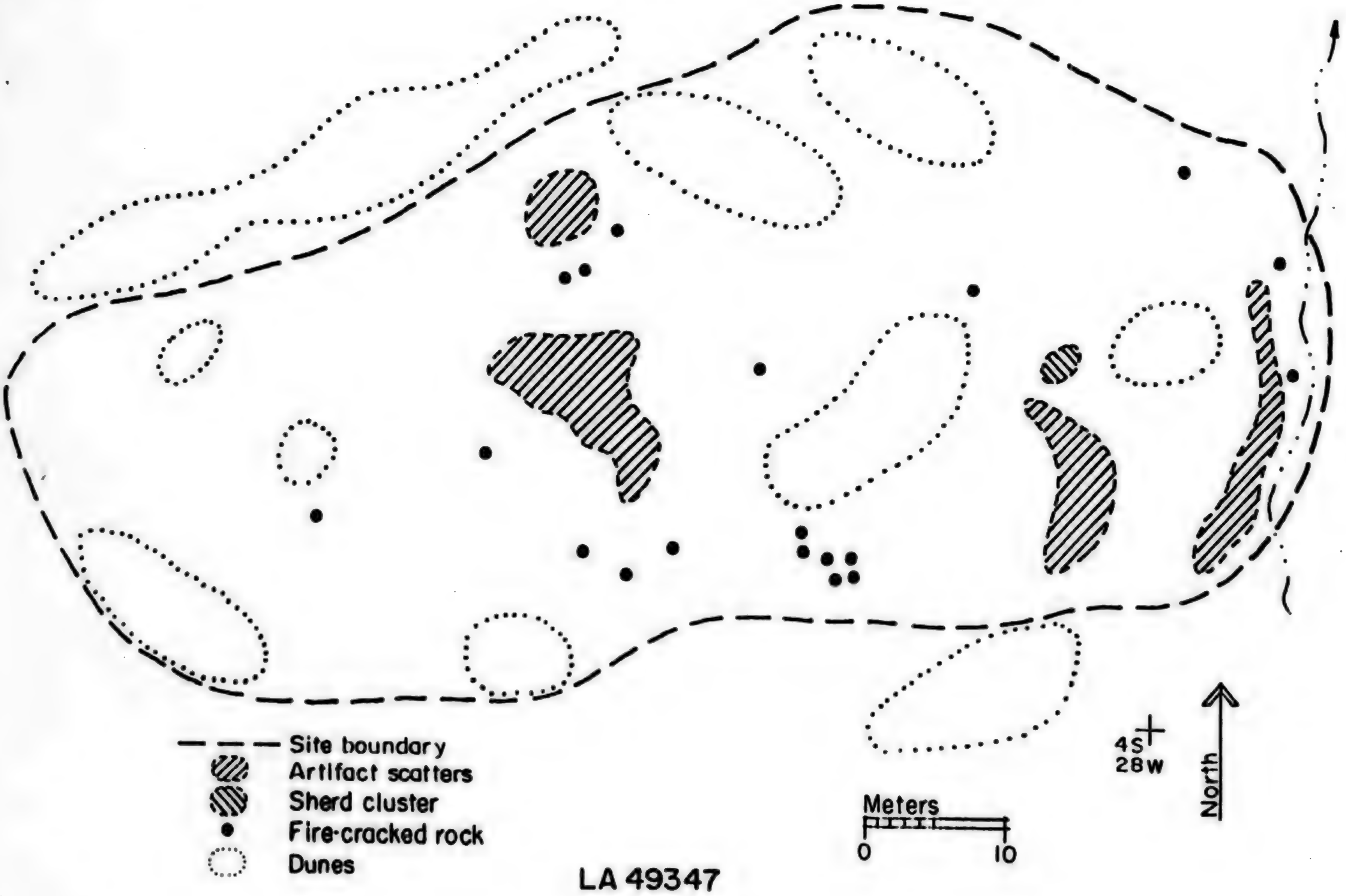

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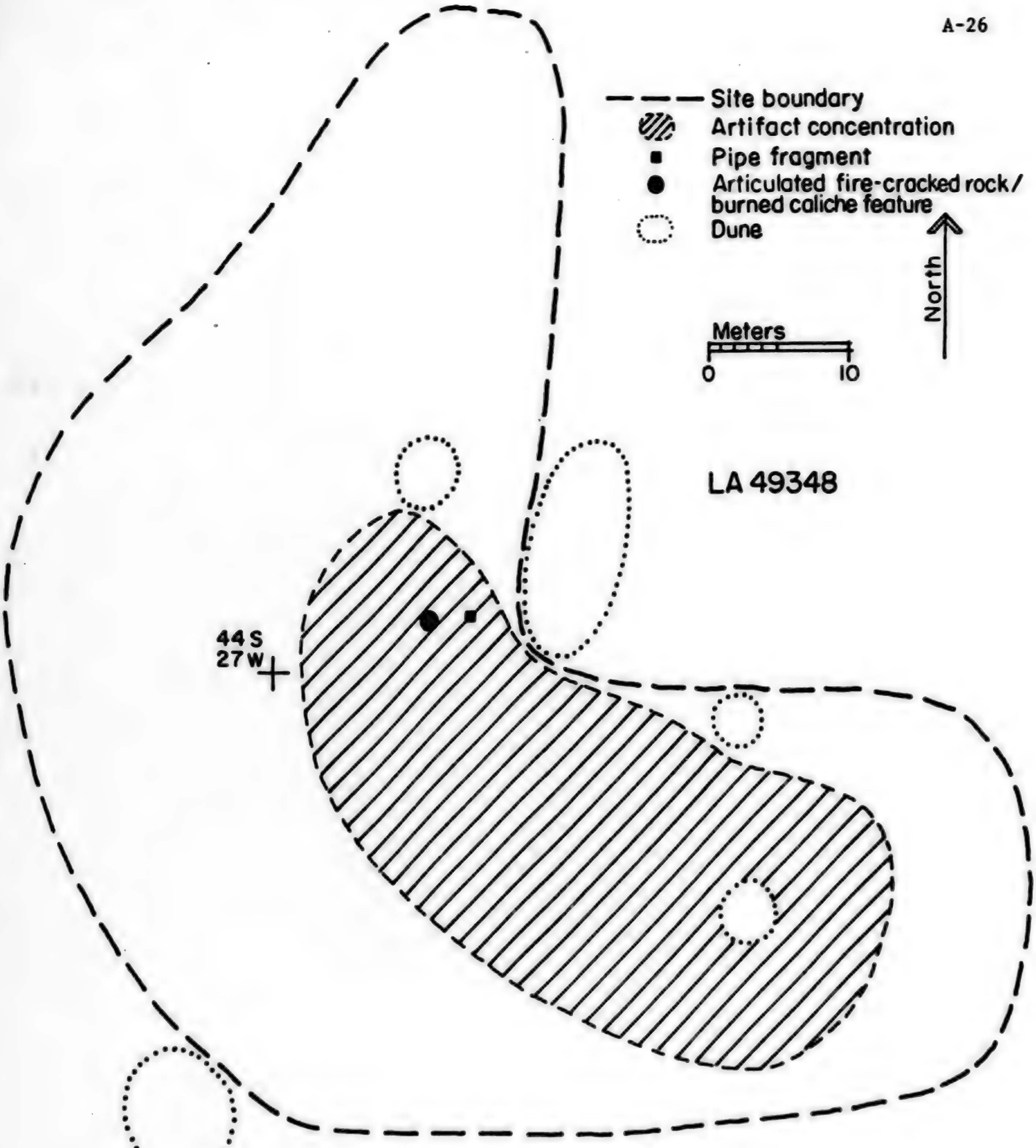

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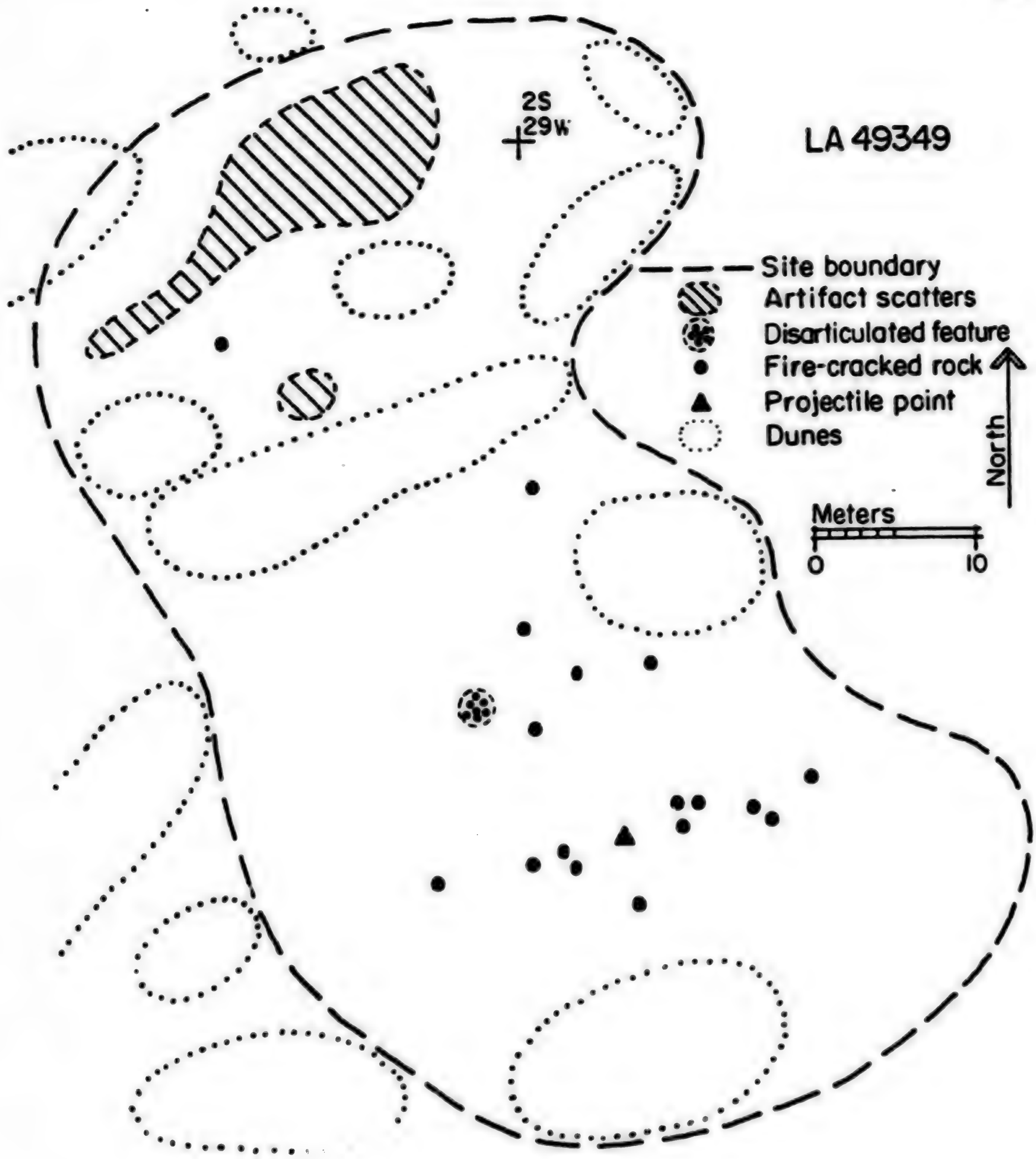

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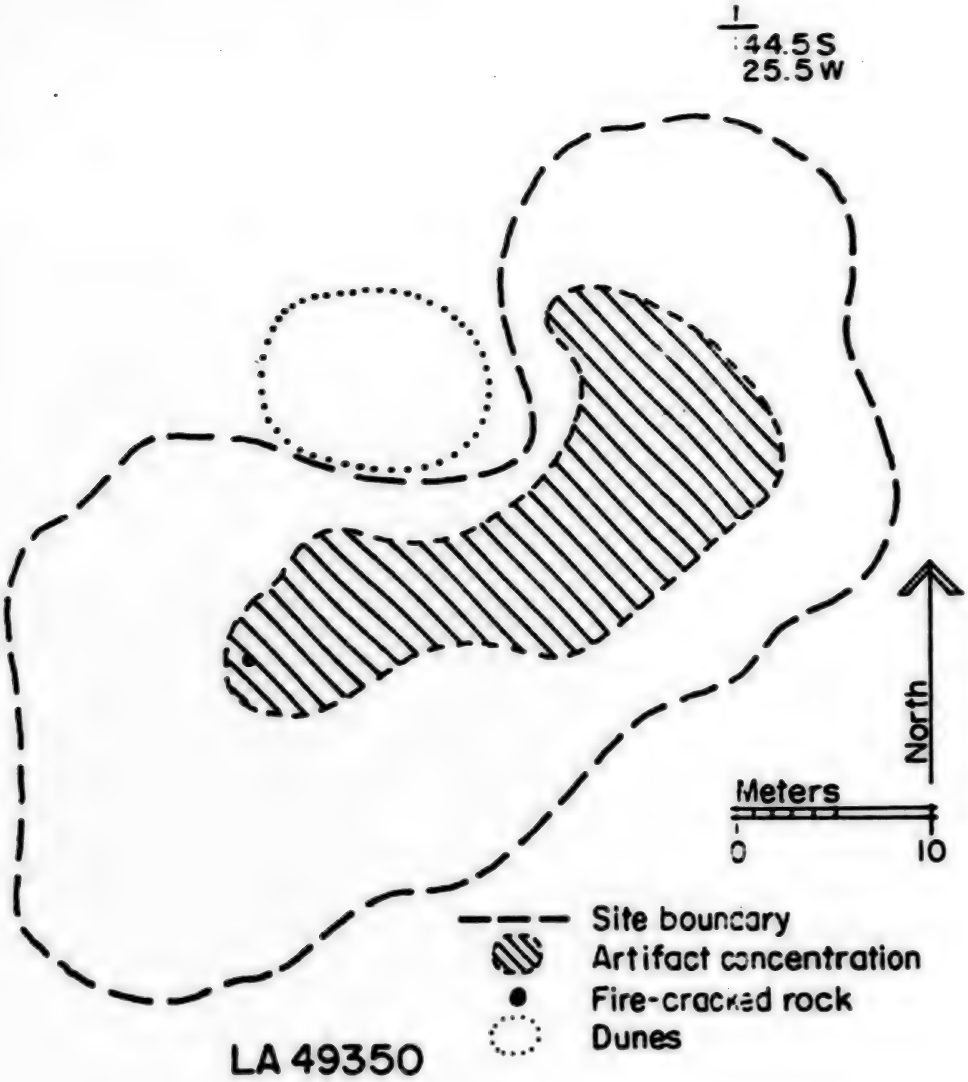

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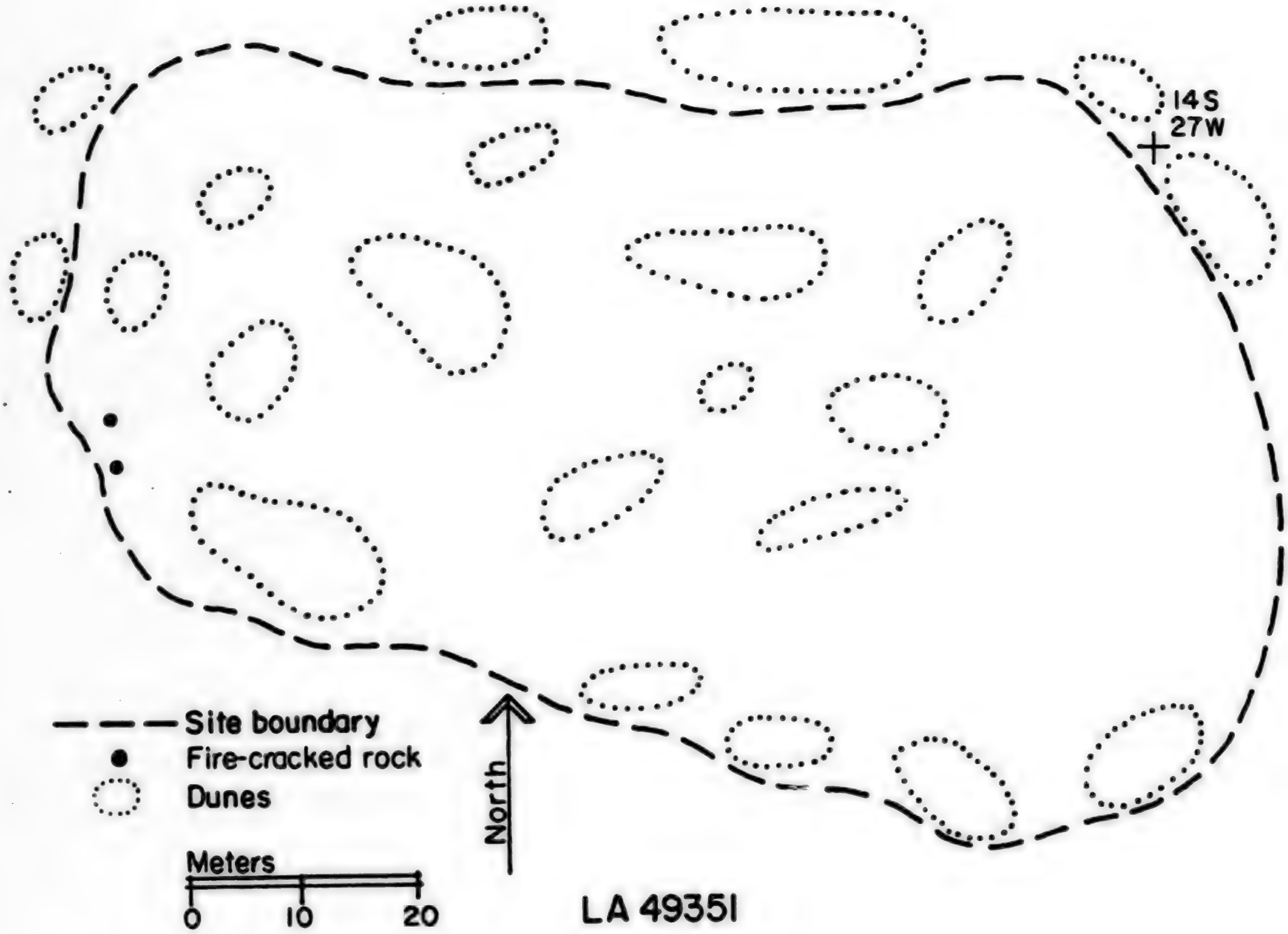

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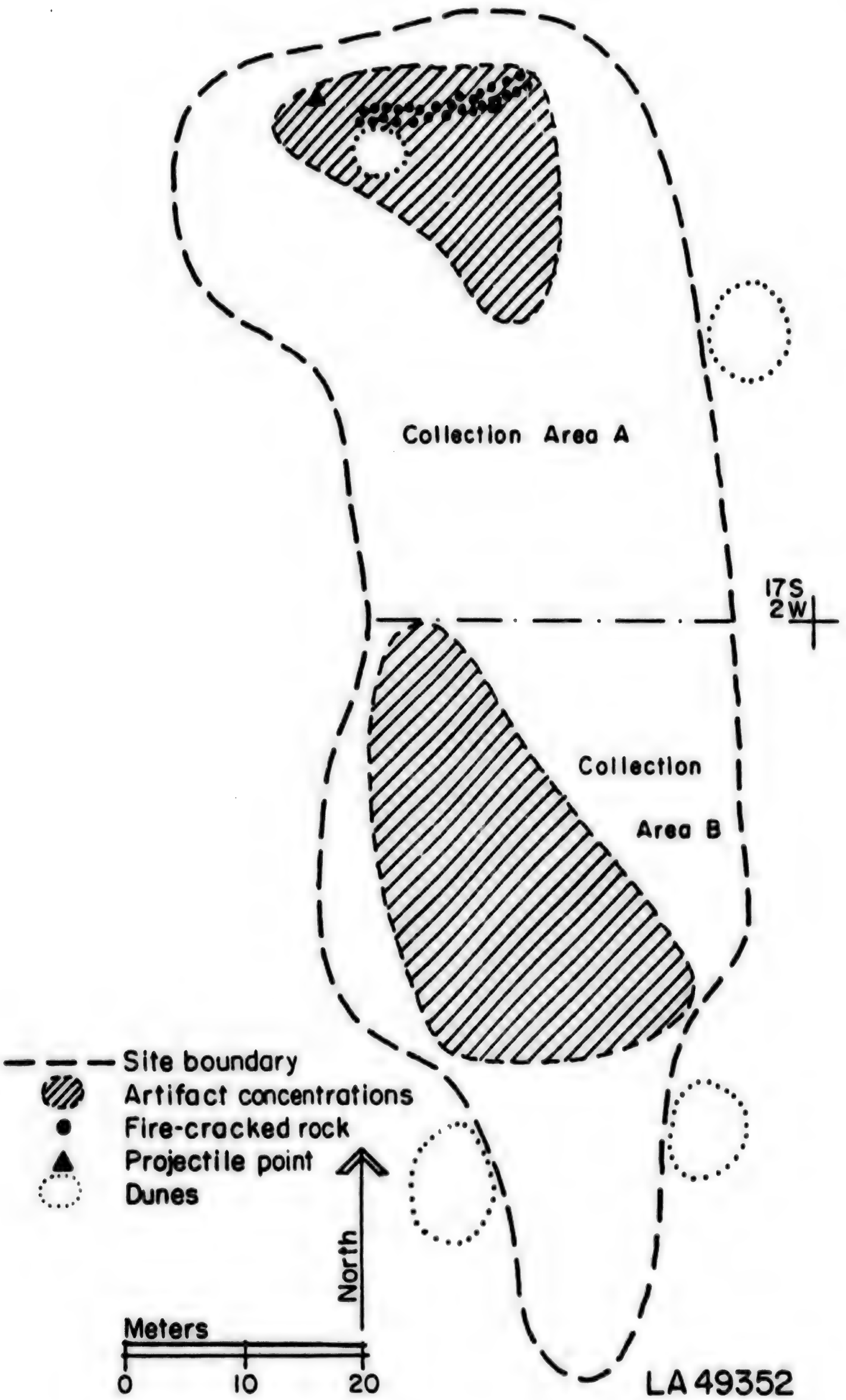

Figure A.36. Site map of LA 49352.

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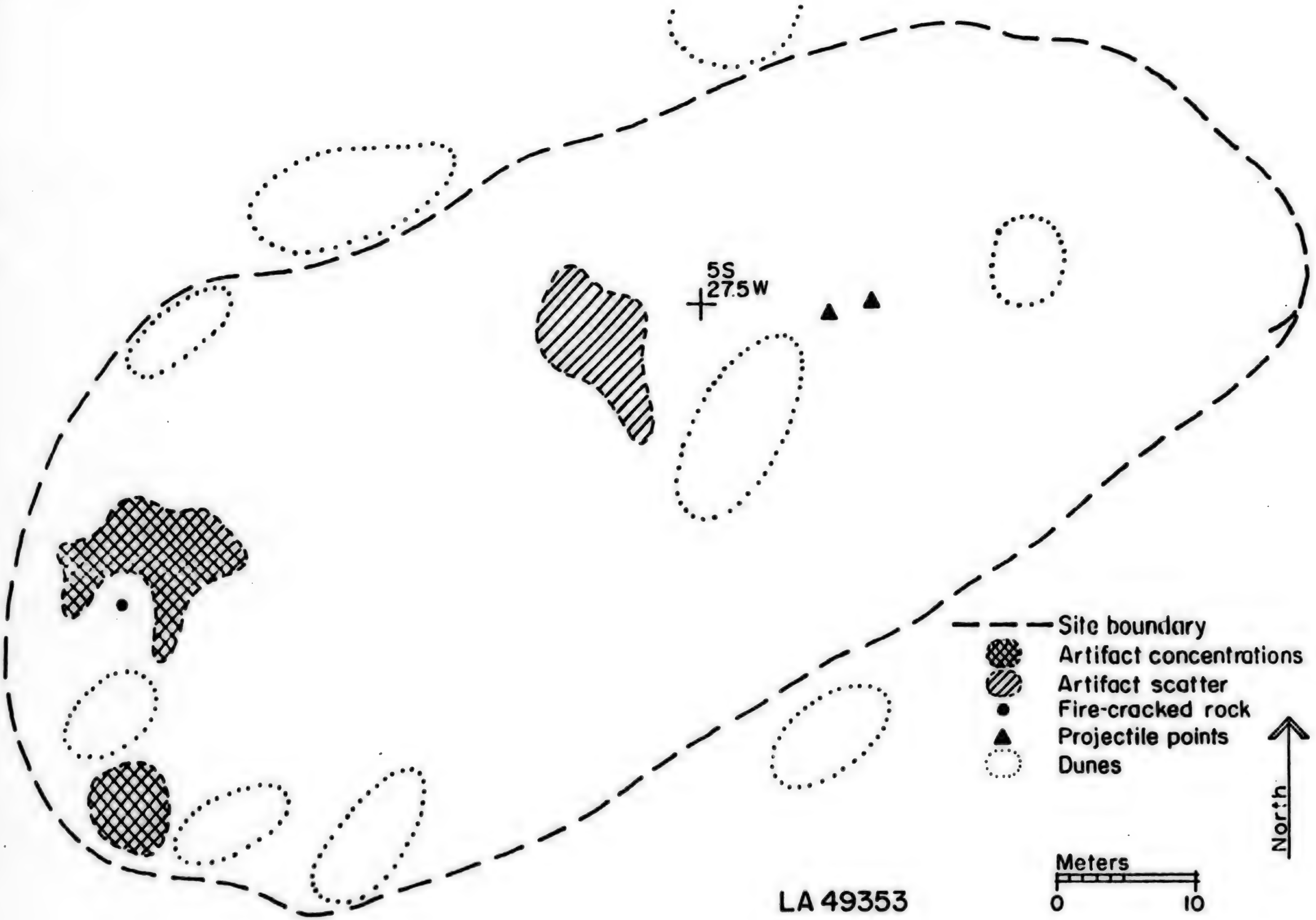

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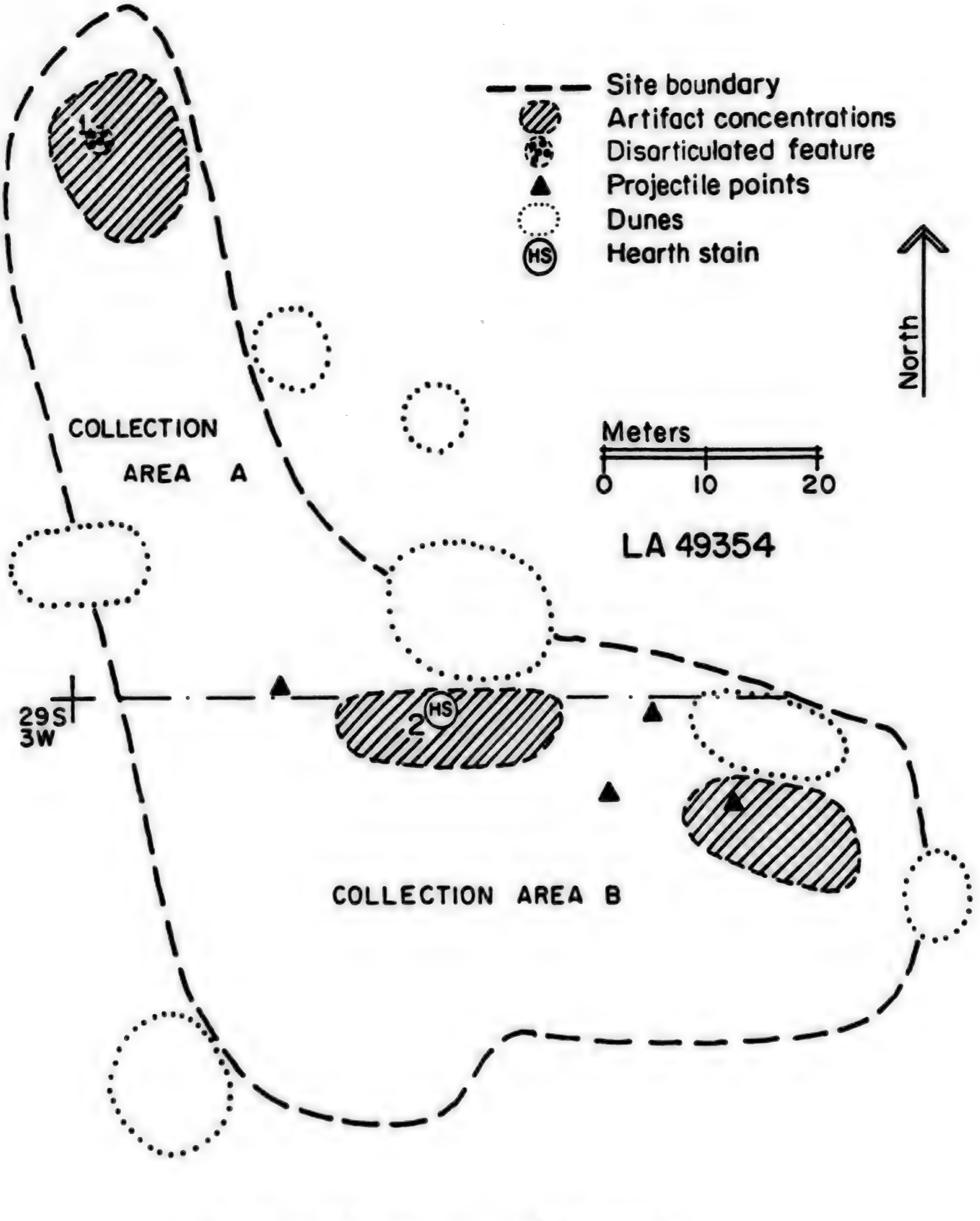

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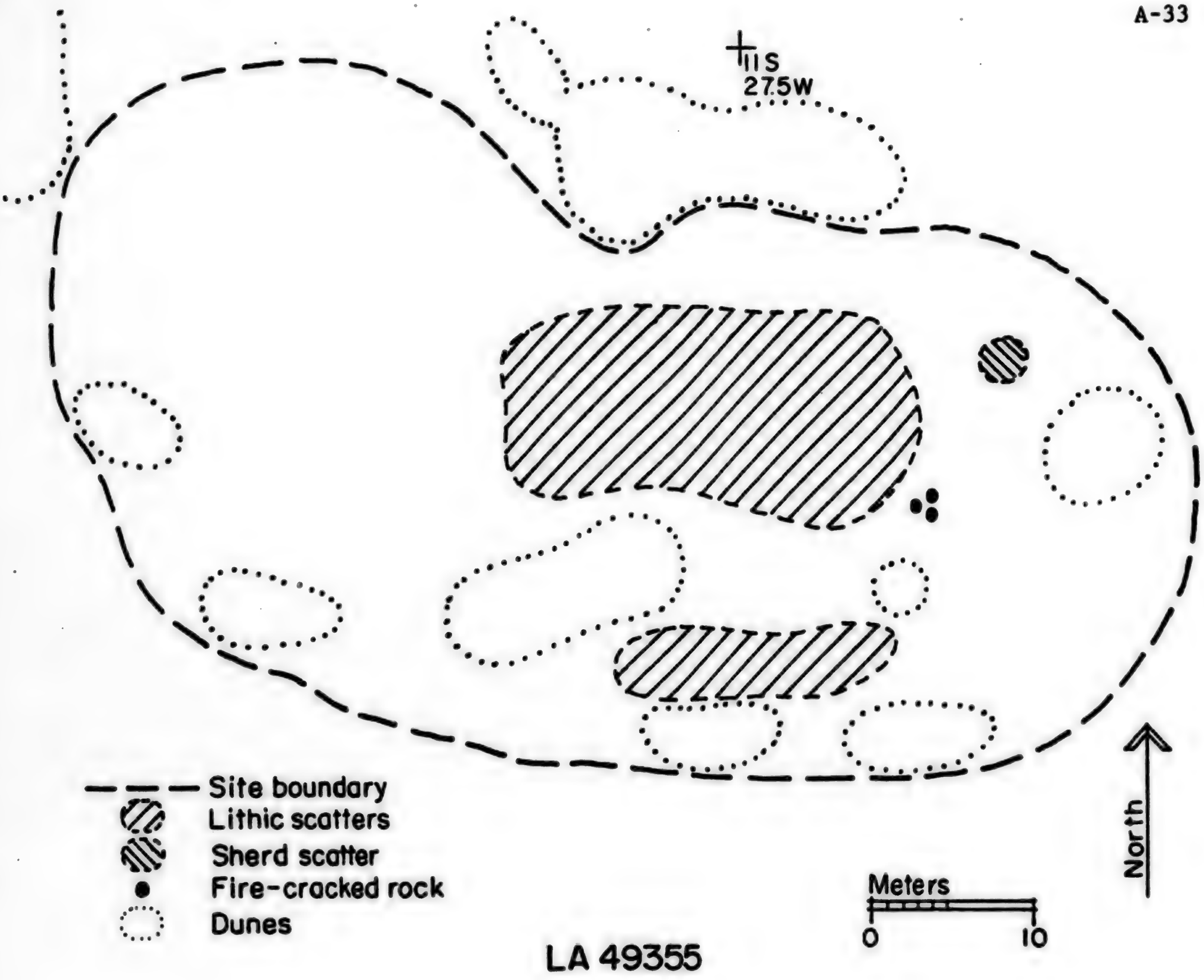

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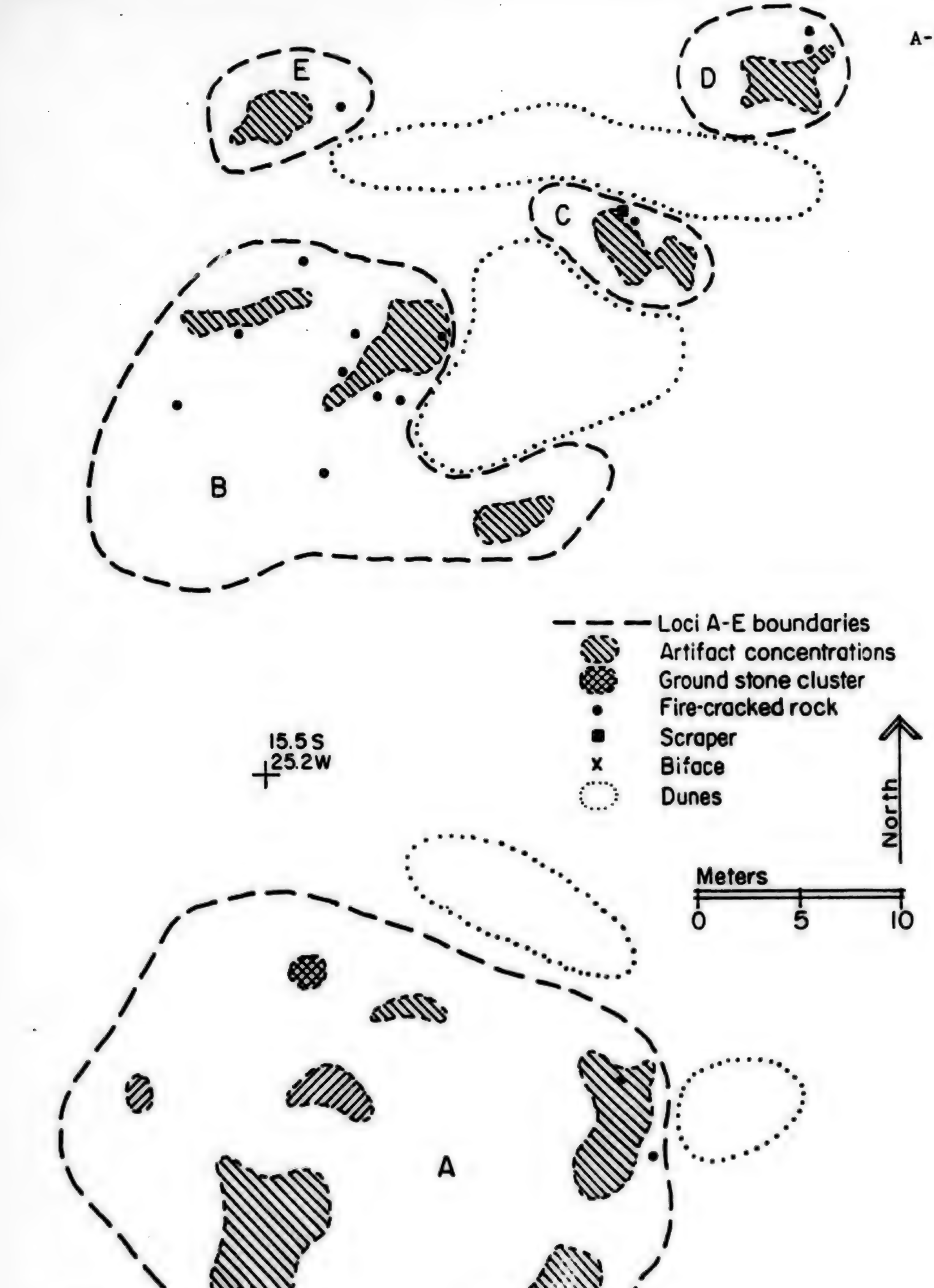

LA 49356

Figure A.40. Site map of LA 49356.

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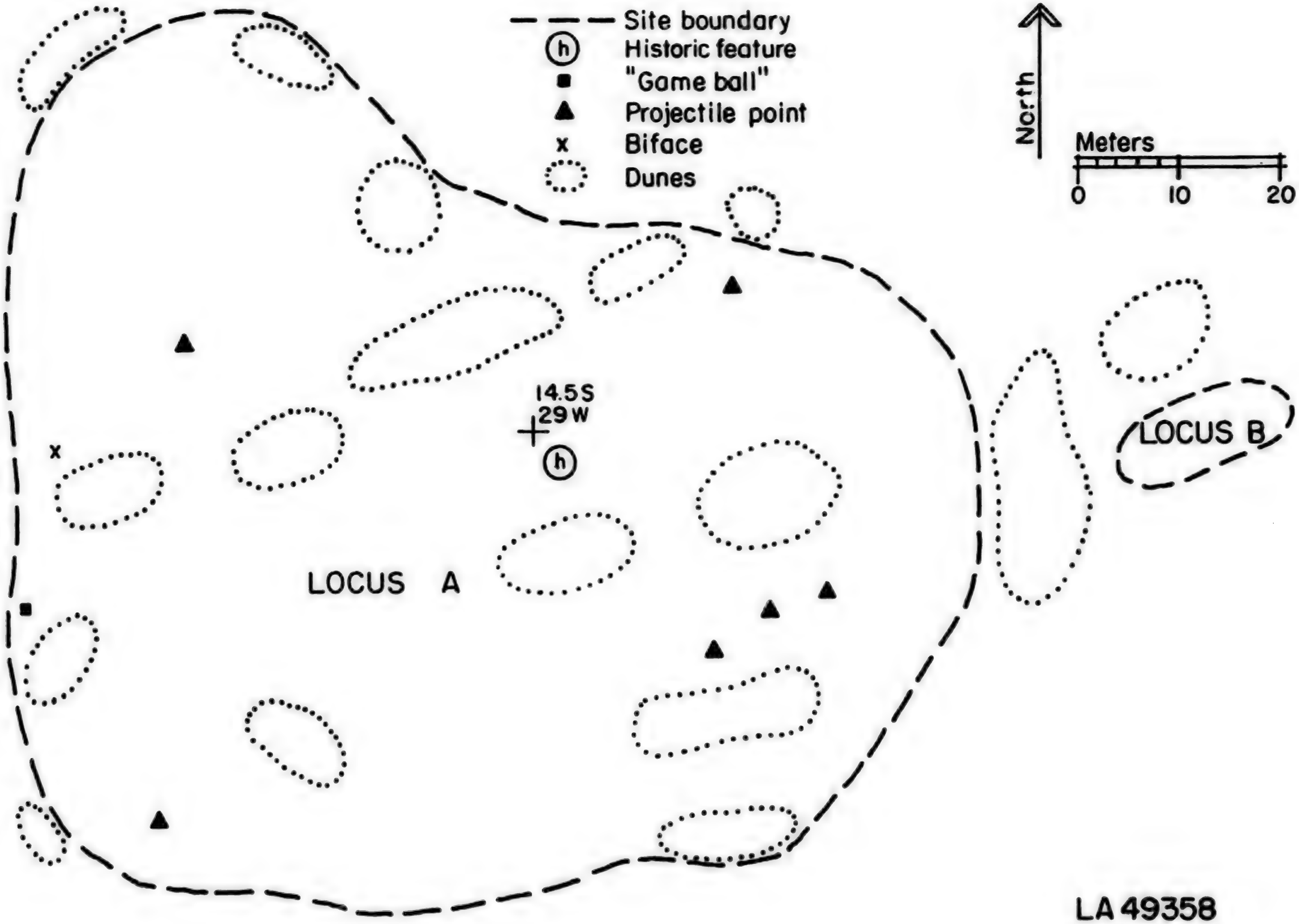
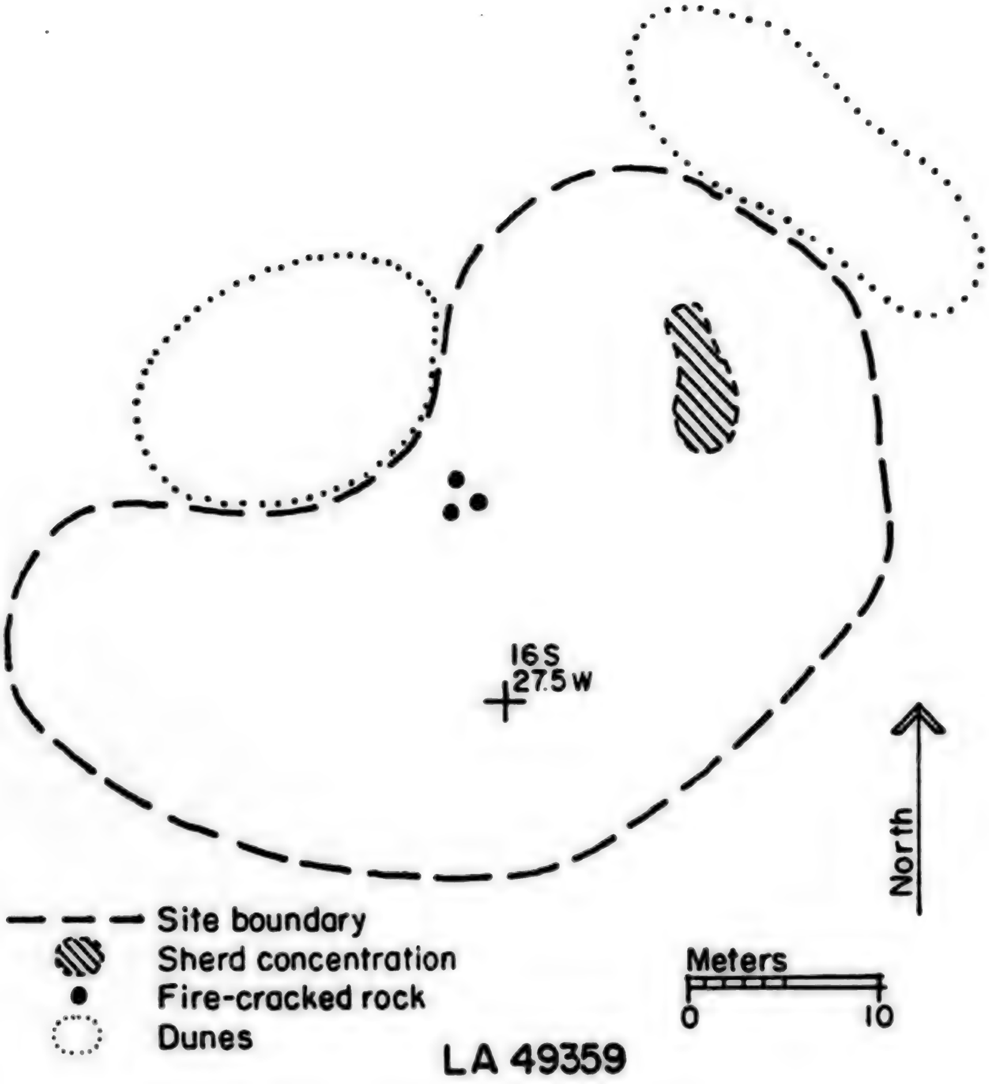


298

Figure A.42. Site map of LA 49358.



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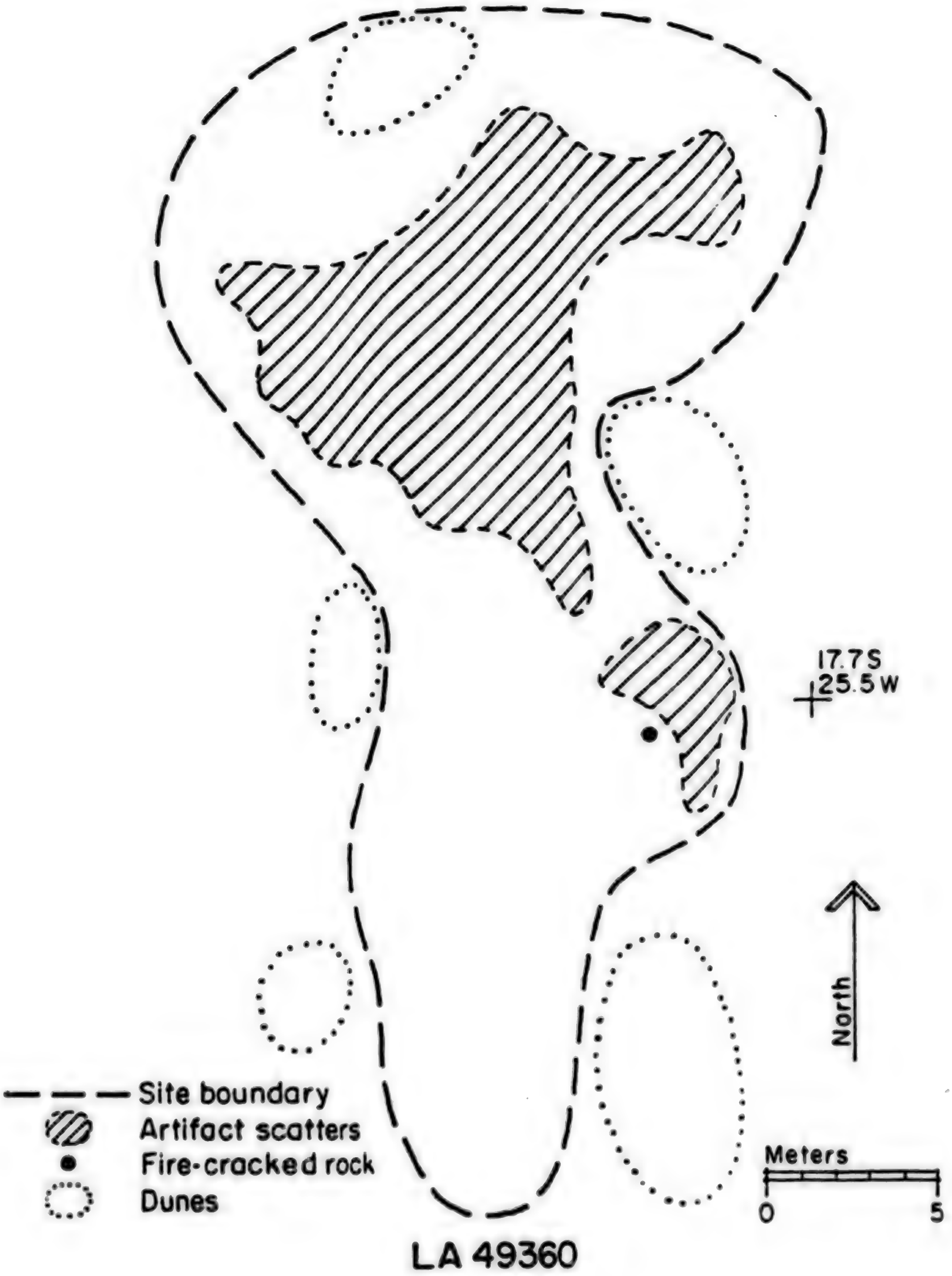

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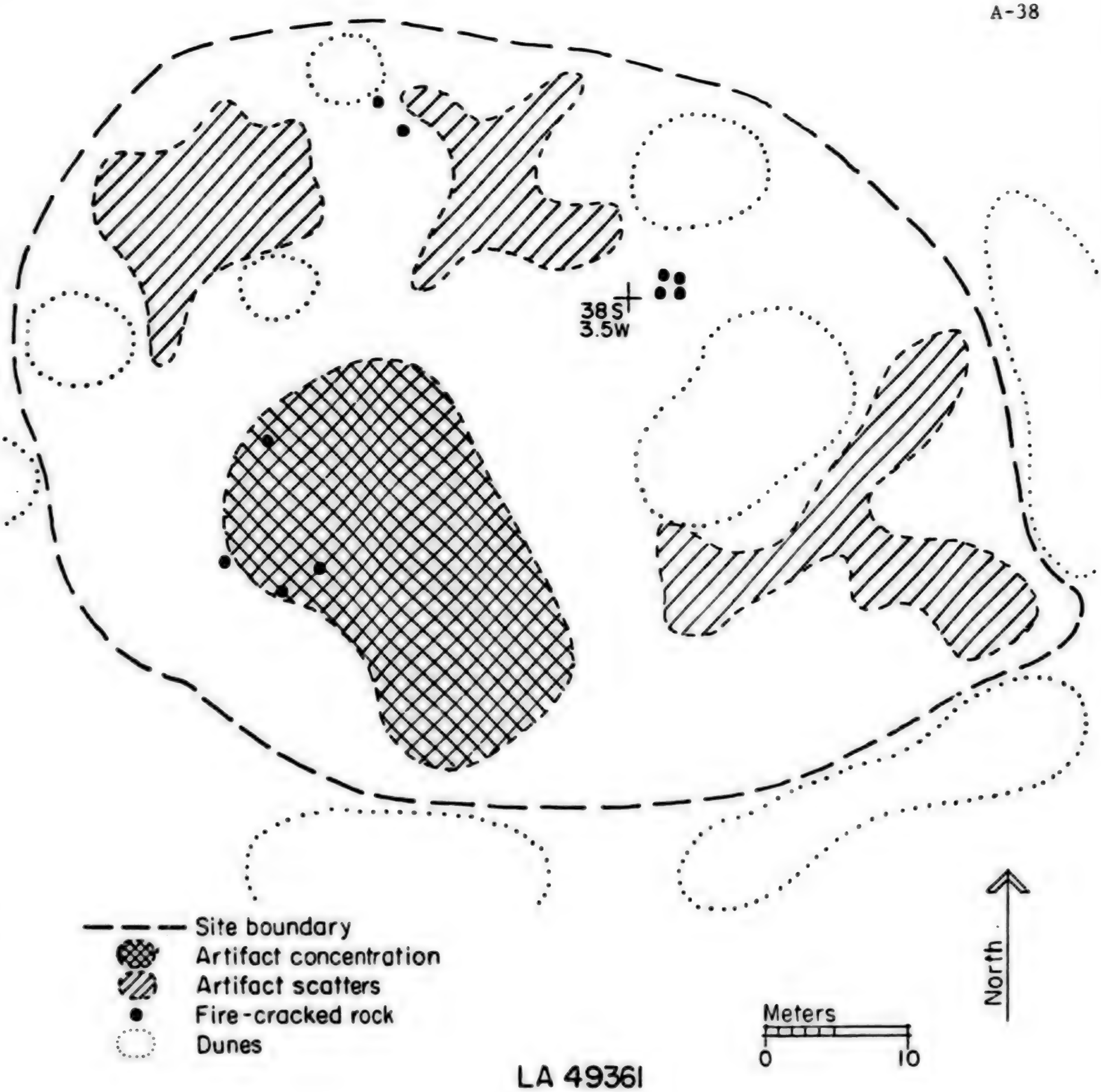

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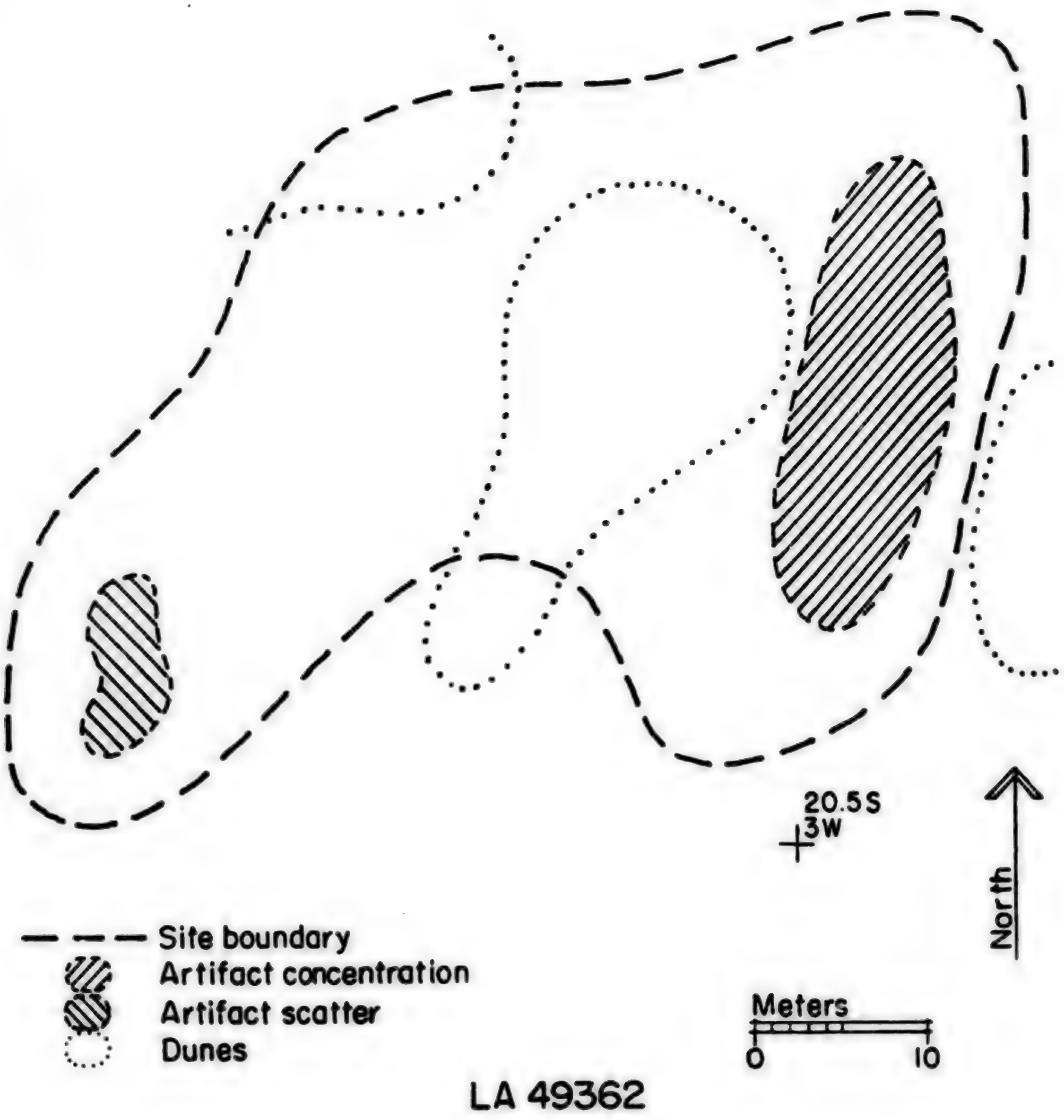
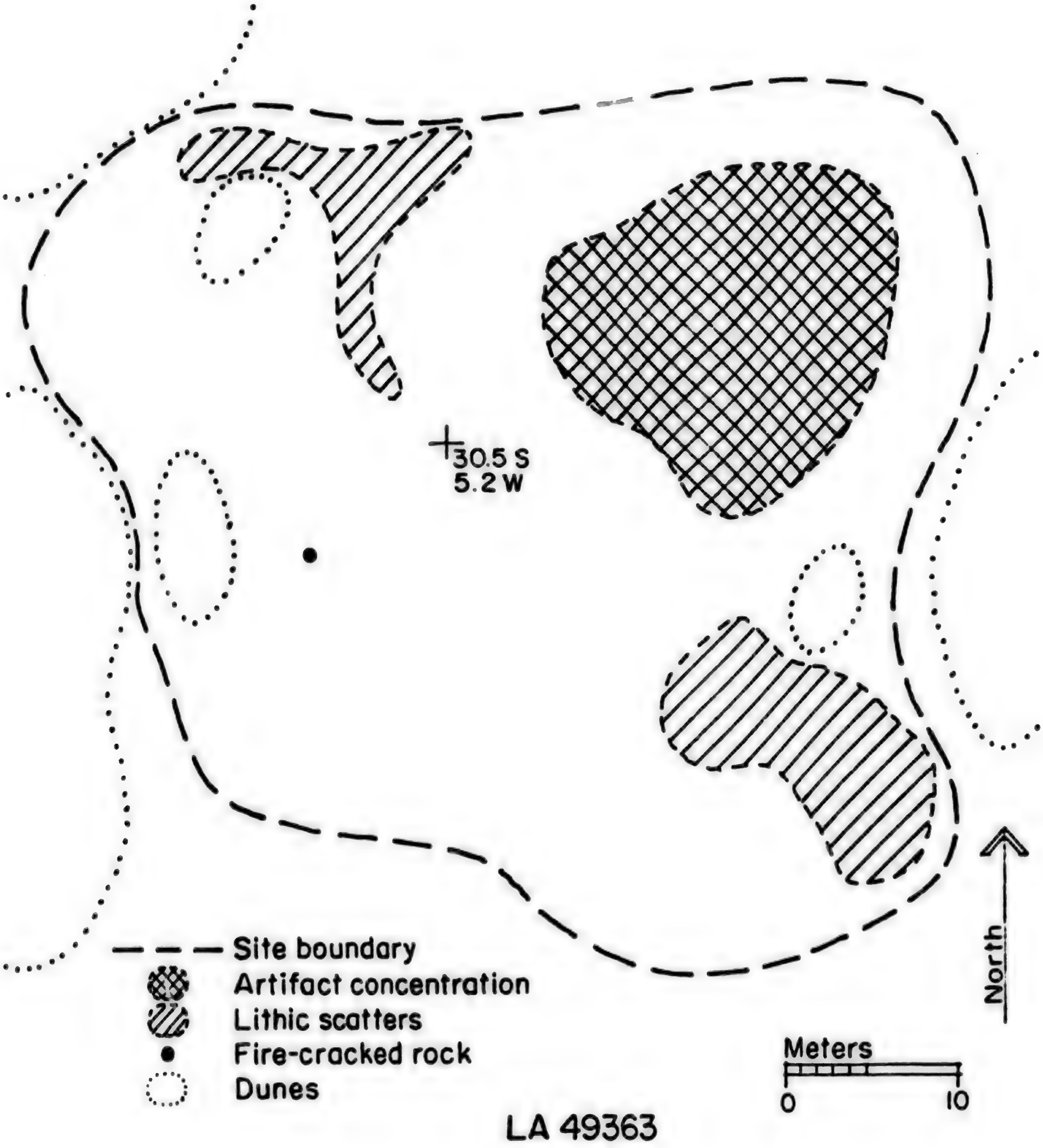


Figure A.46. Site map of LA 49362.



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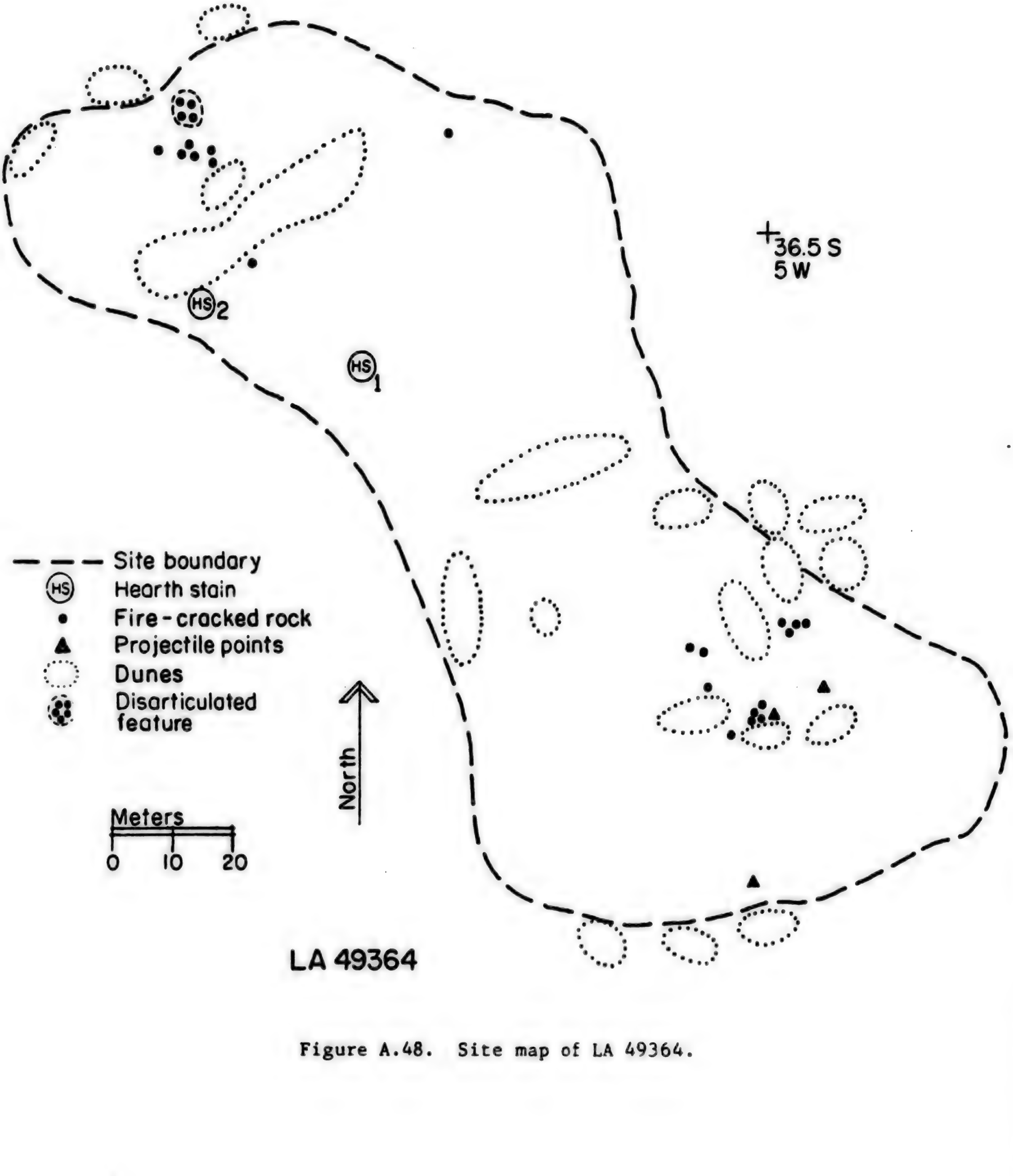


Figure A.48. Site map of LA 49364.

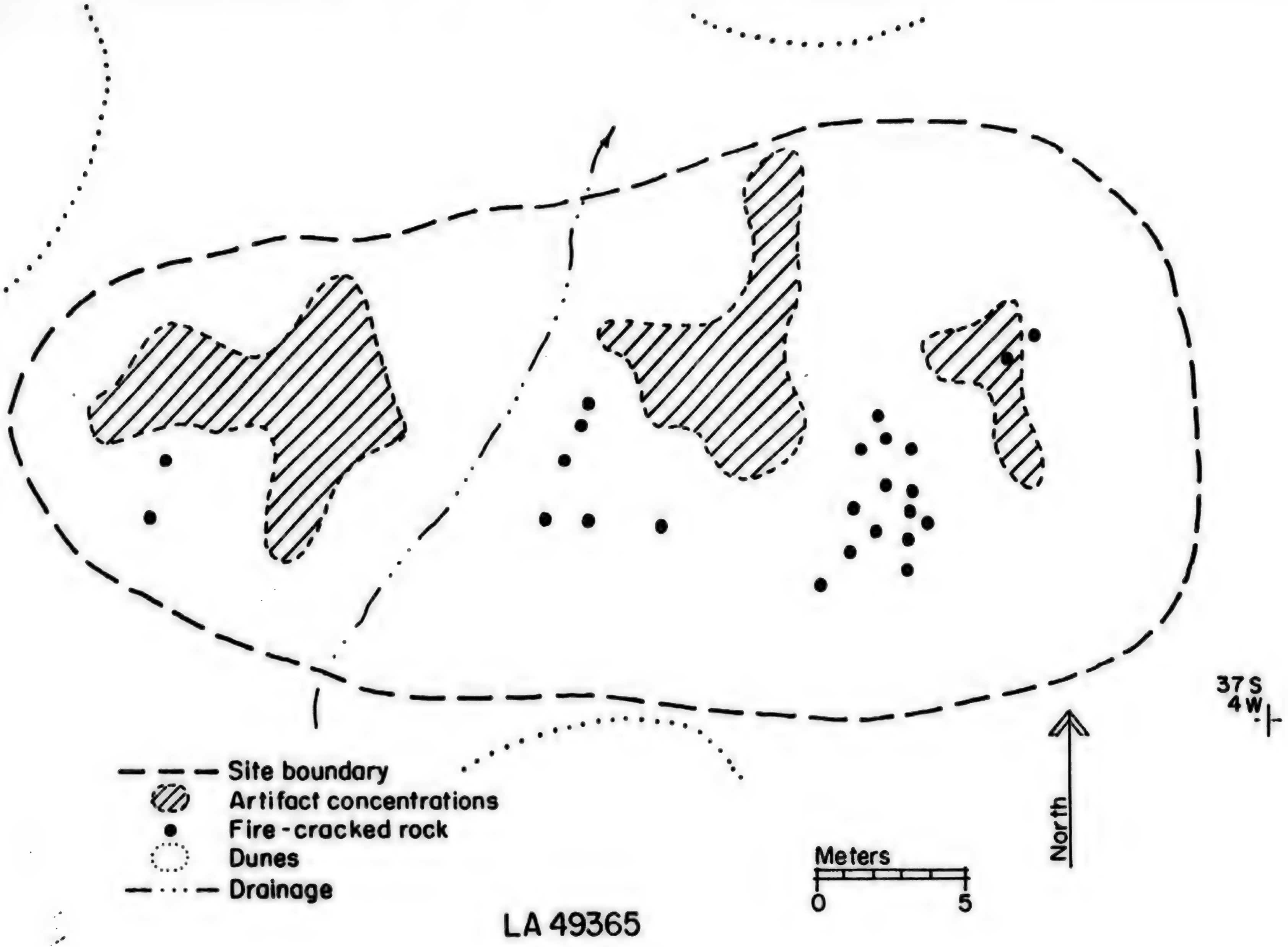


Figure A.49. Site map of LA 49365.

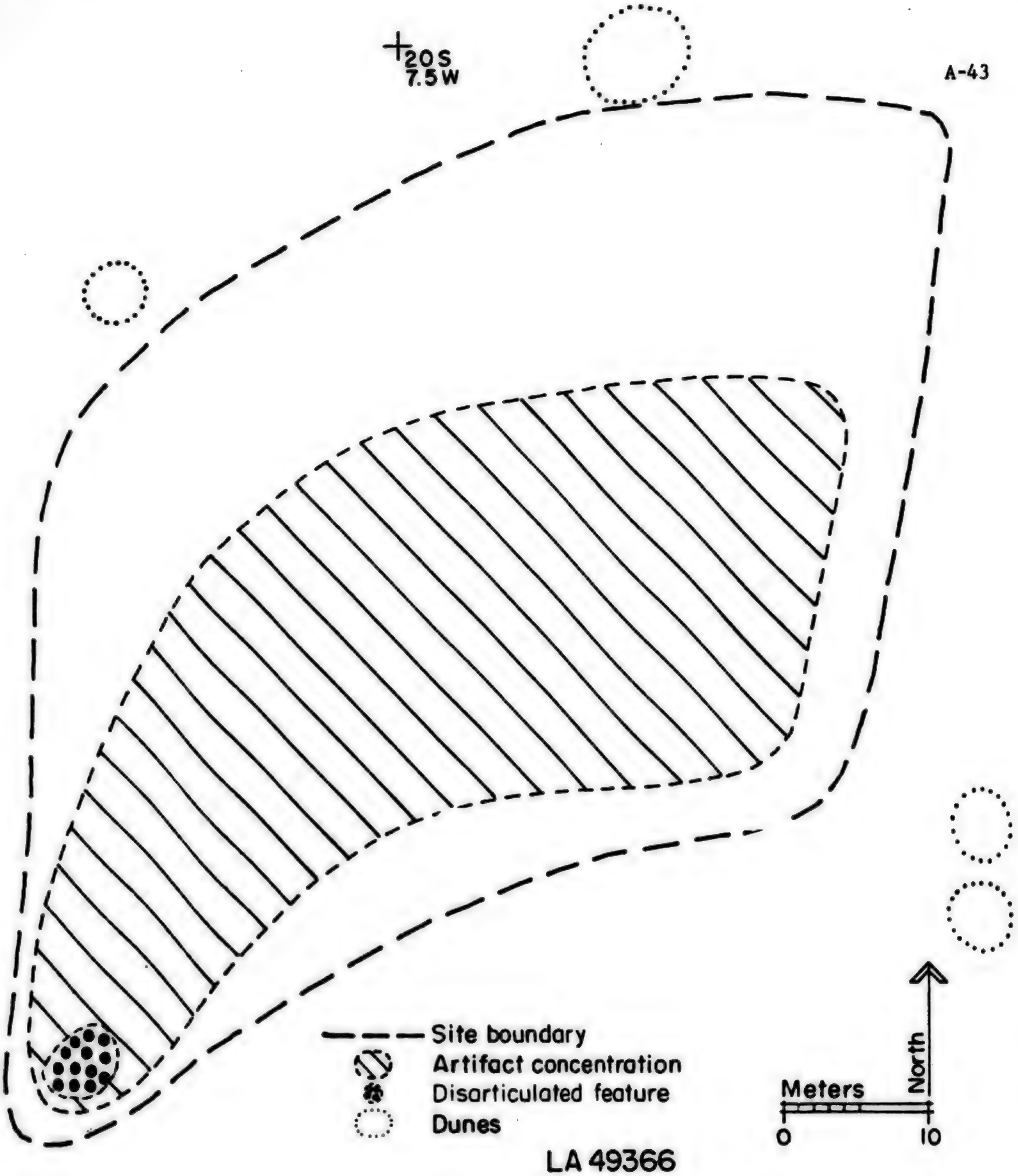


Figure A.50. Site map of LA 49366.

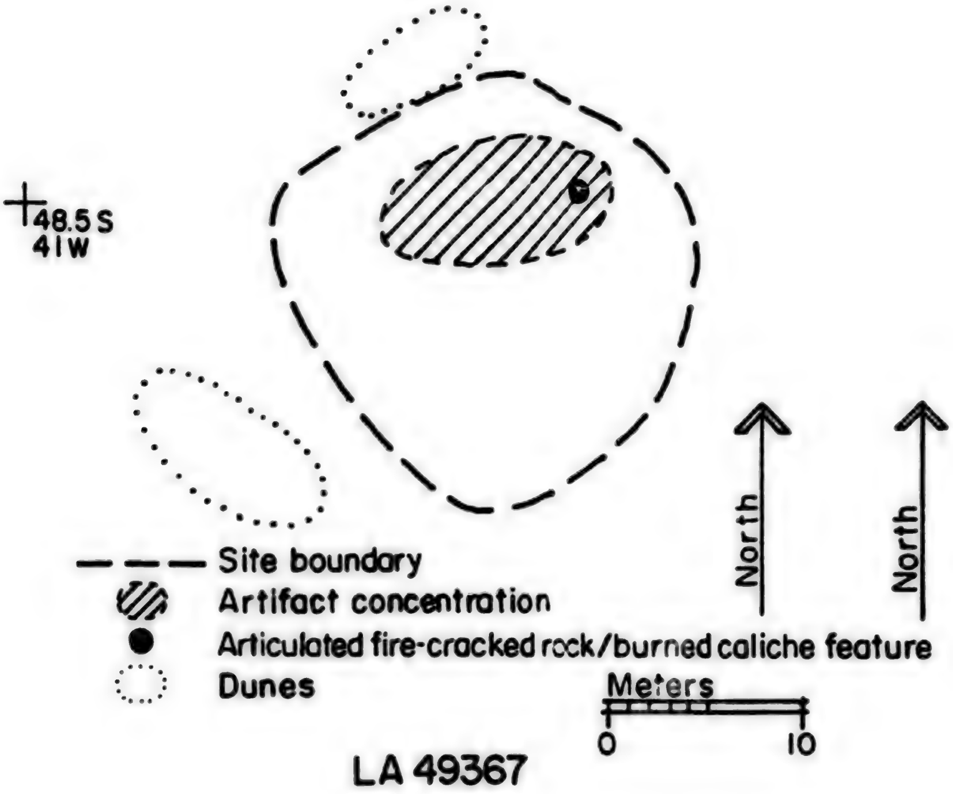


Figure A.51. Site map of LA 49367.

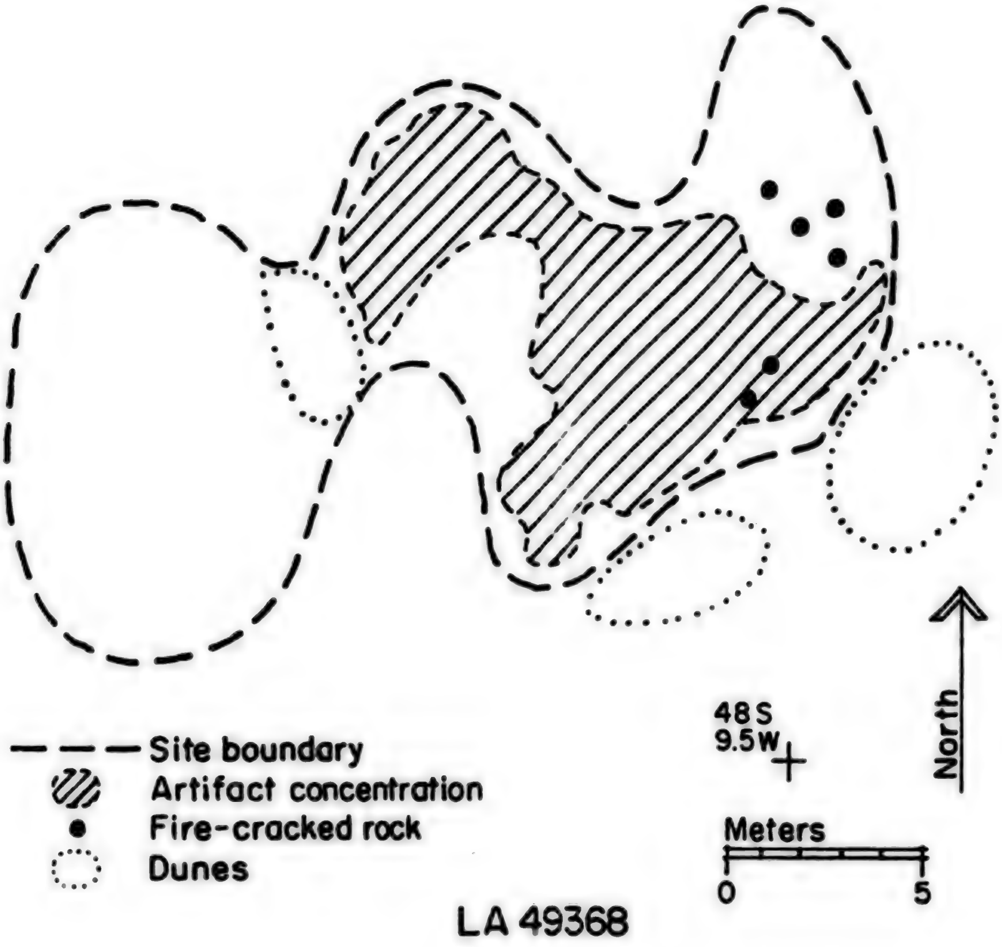
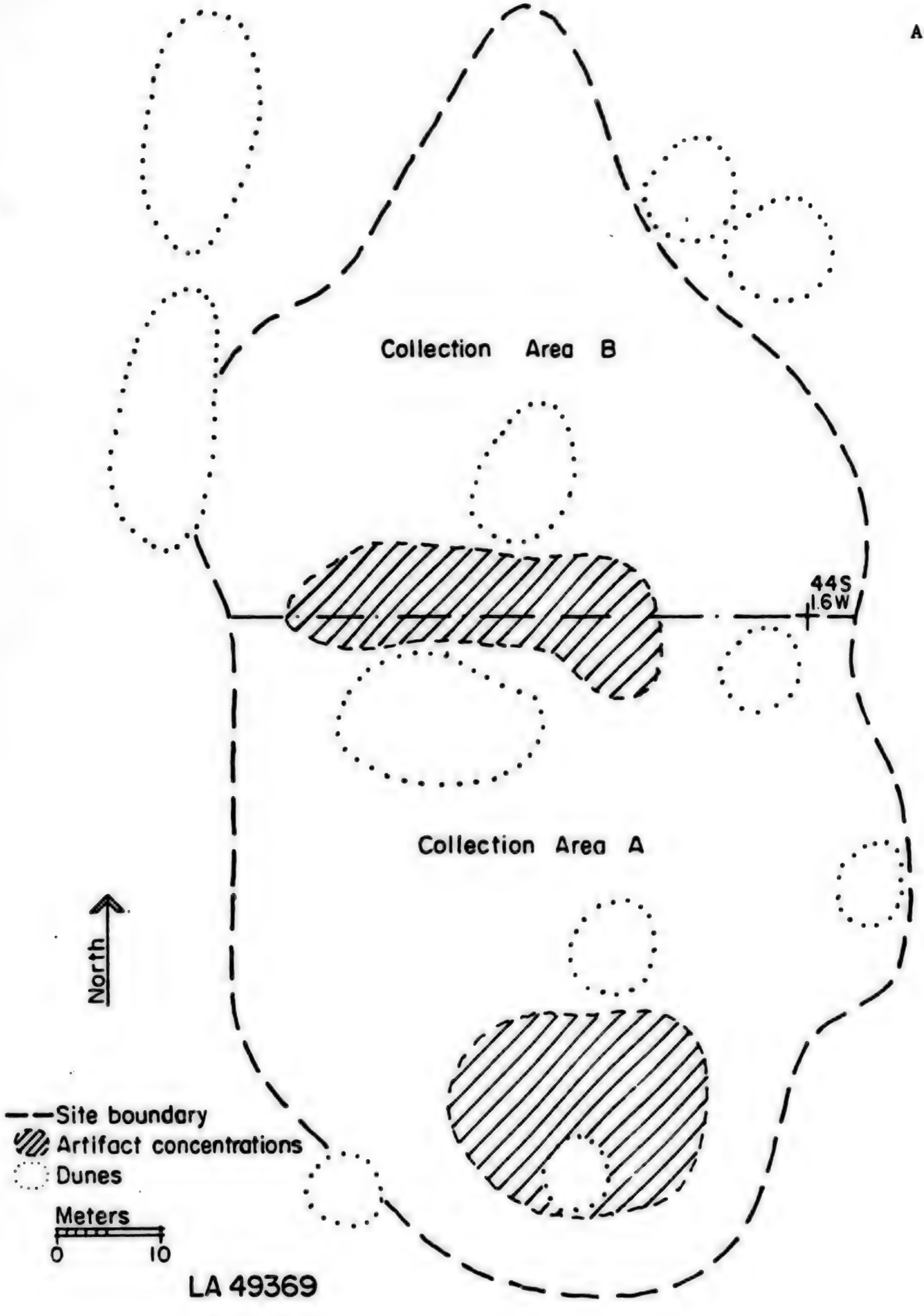


Figure A.52. Site map of LA 49368.



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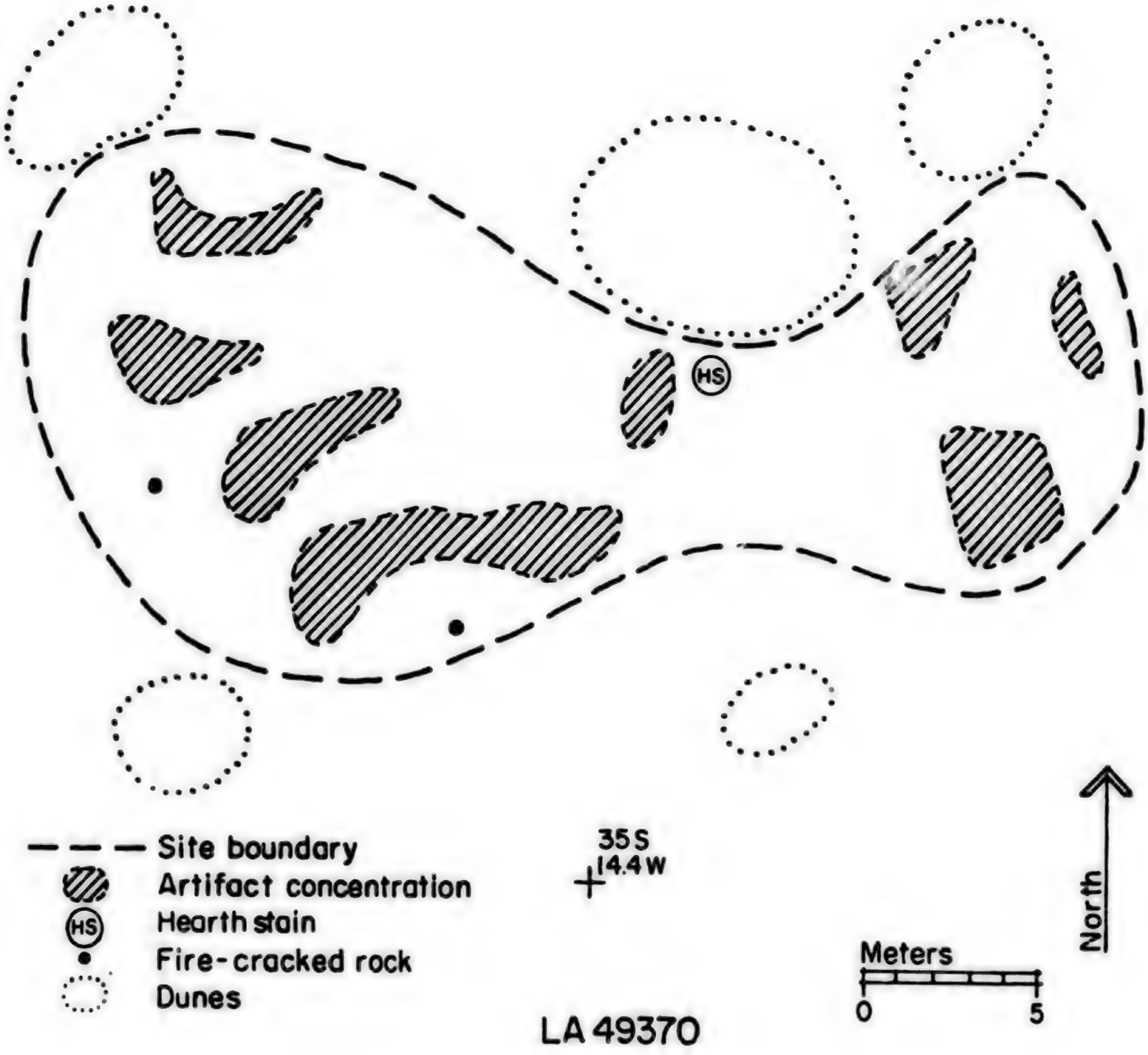
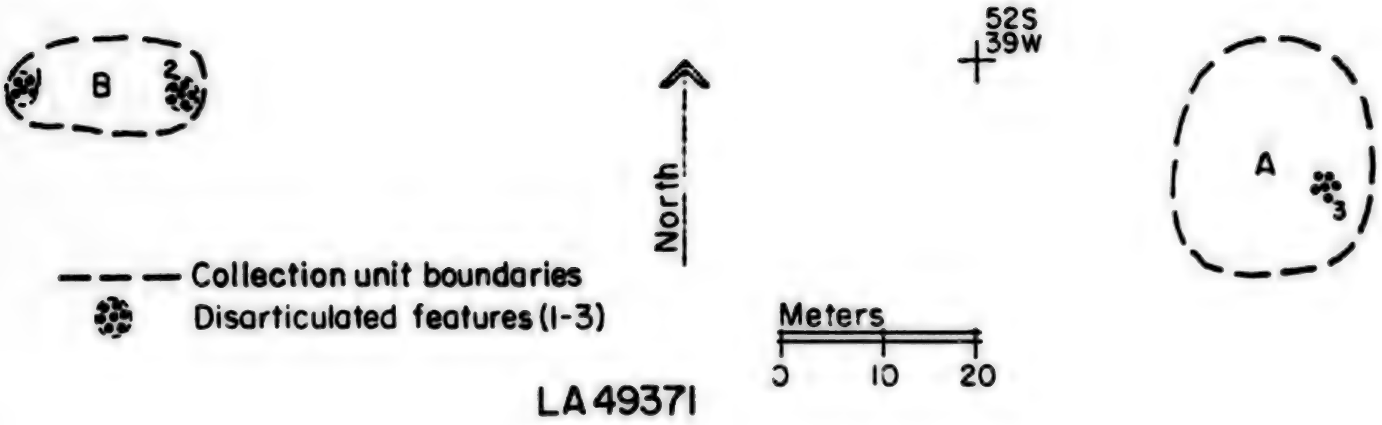


Figure A.54. Site map of LA 49370.



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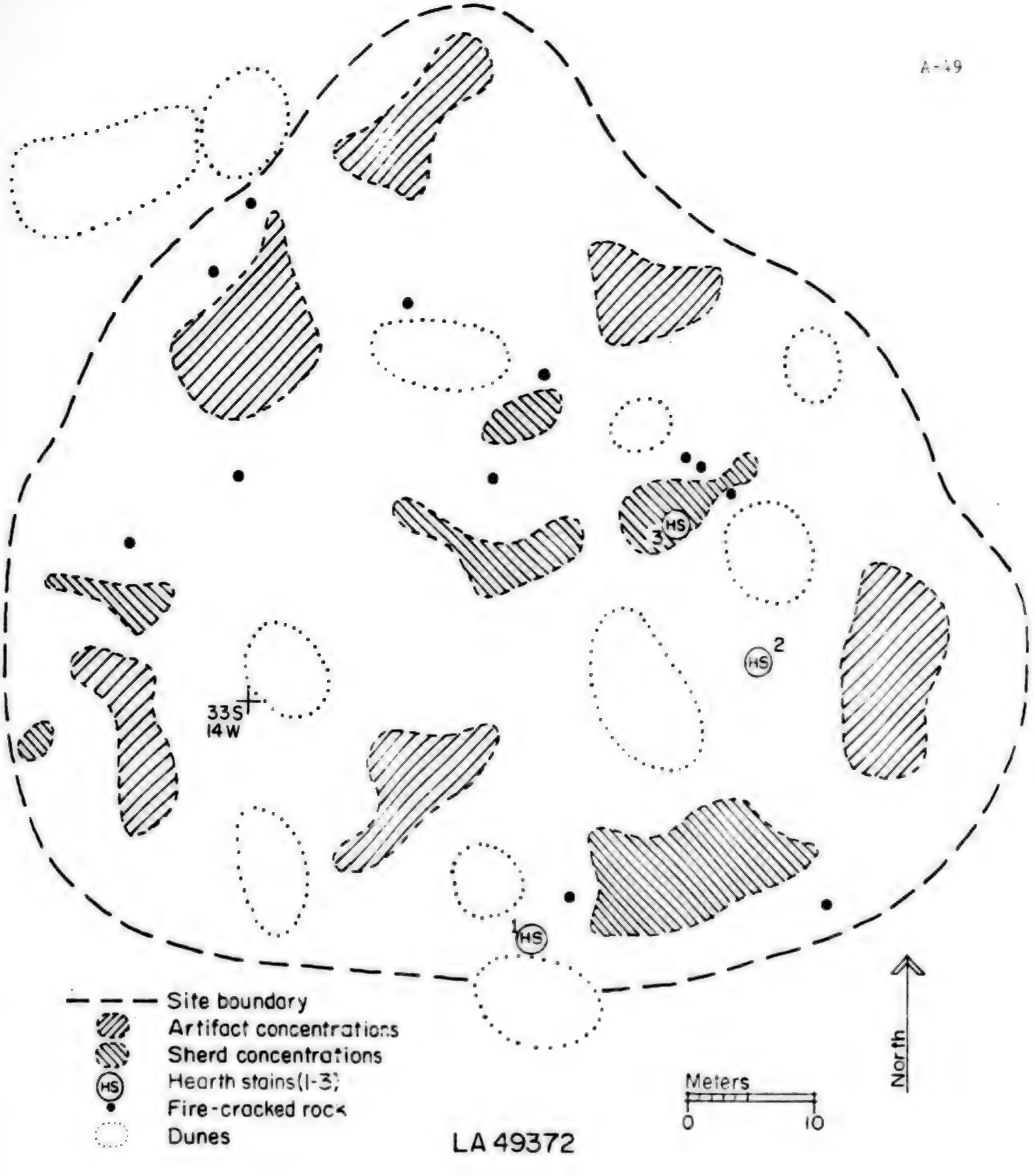

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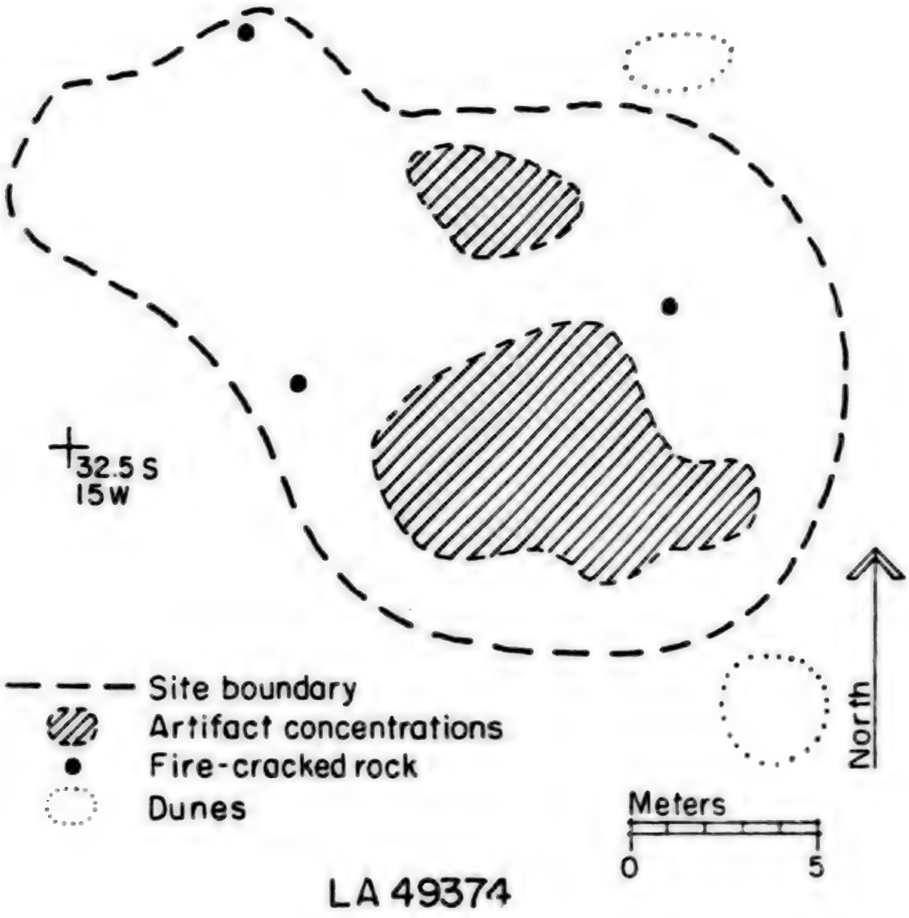


Figure A.57. Site map of LA 49374.

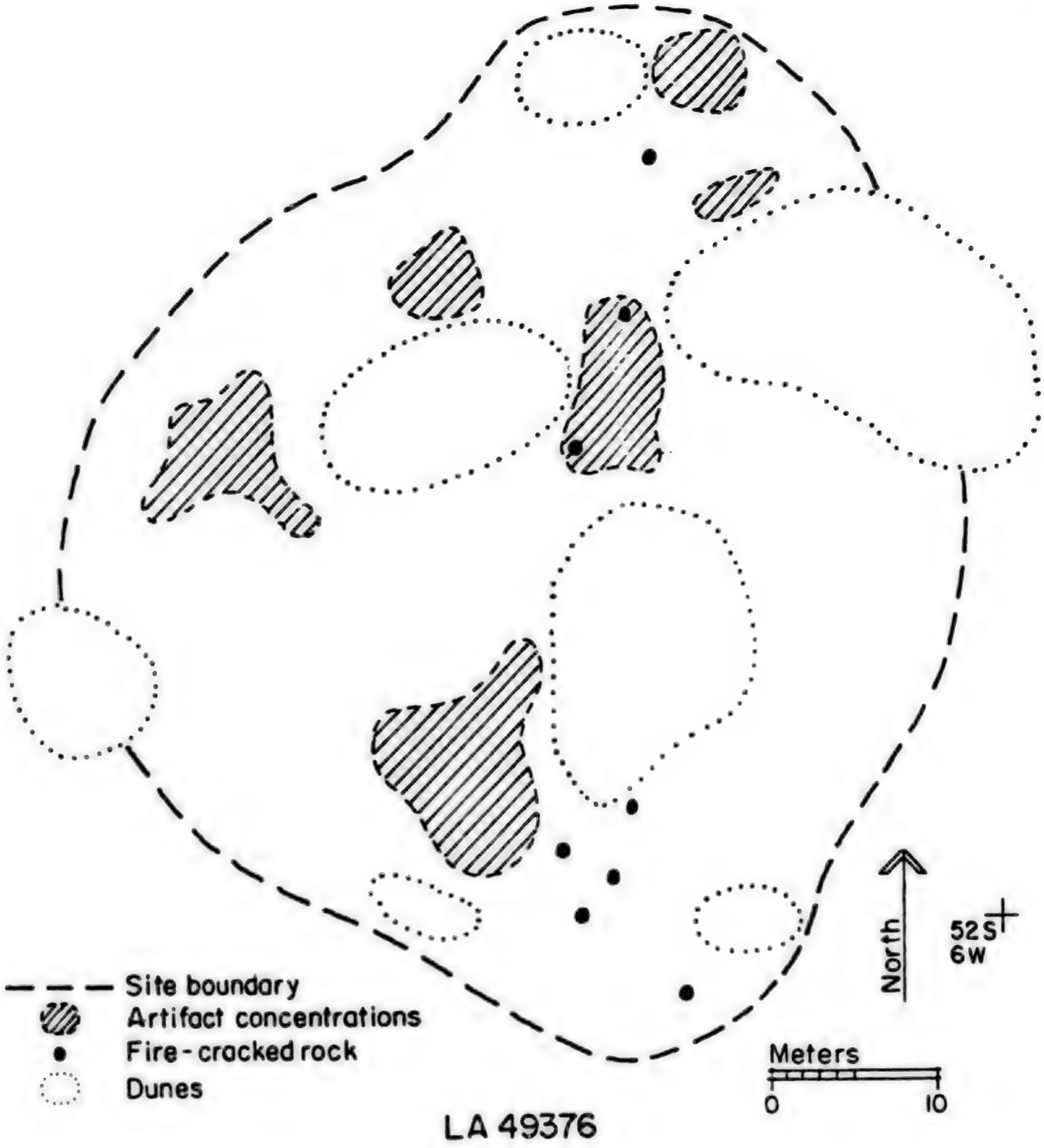


Figure A.58. Site map of LA 49376.

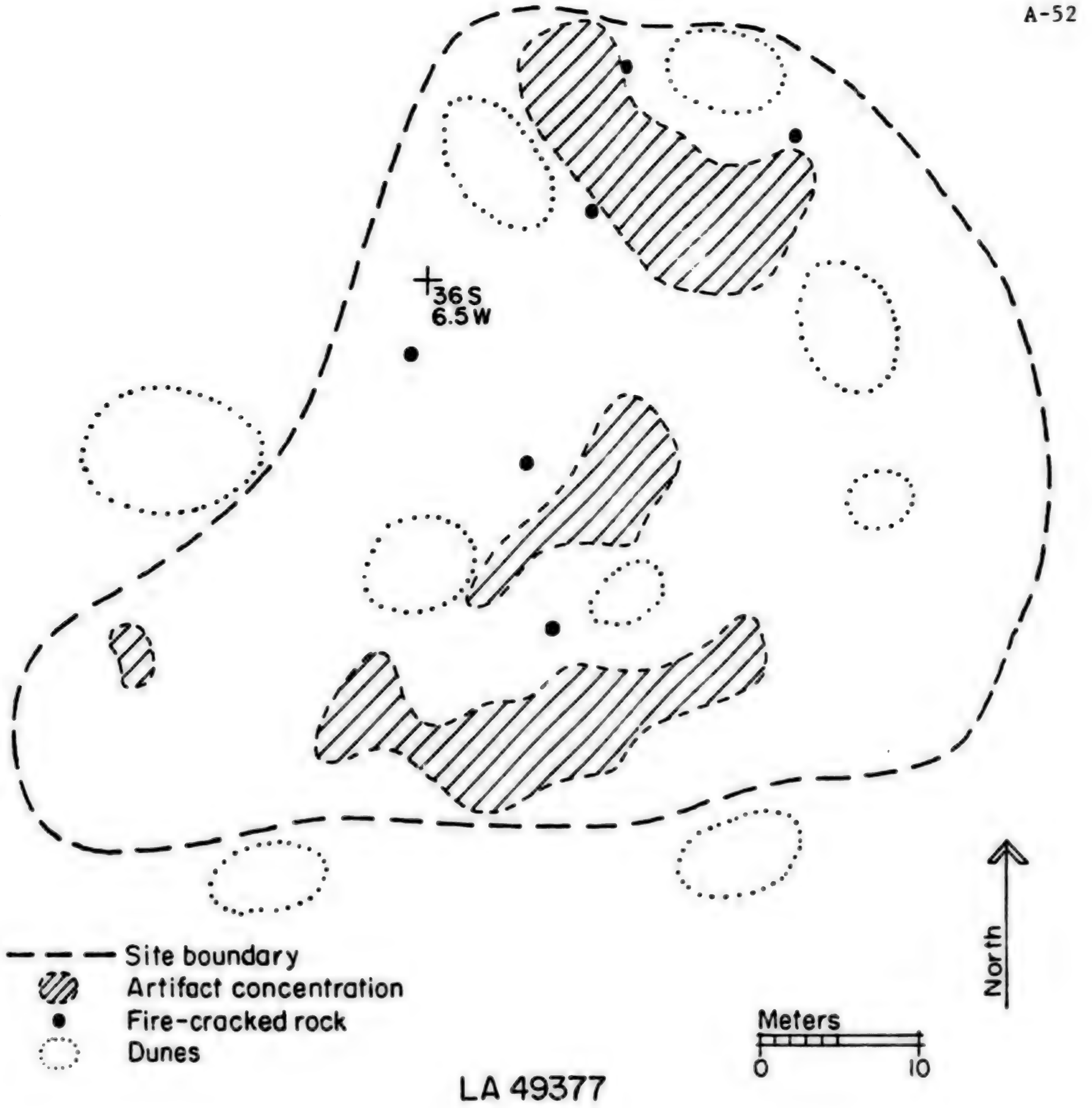


Figure A.59. Site map of LA 49377.

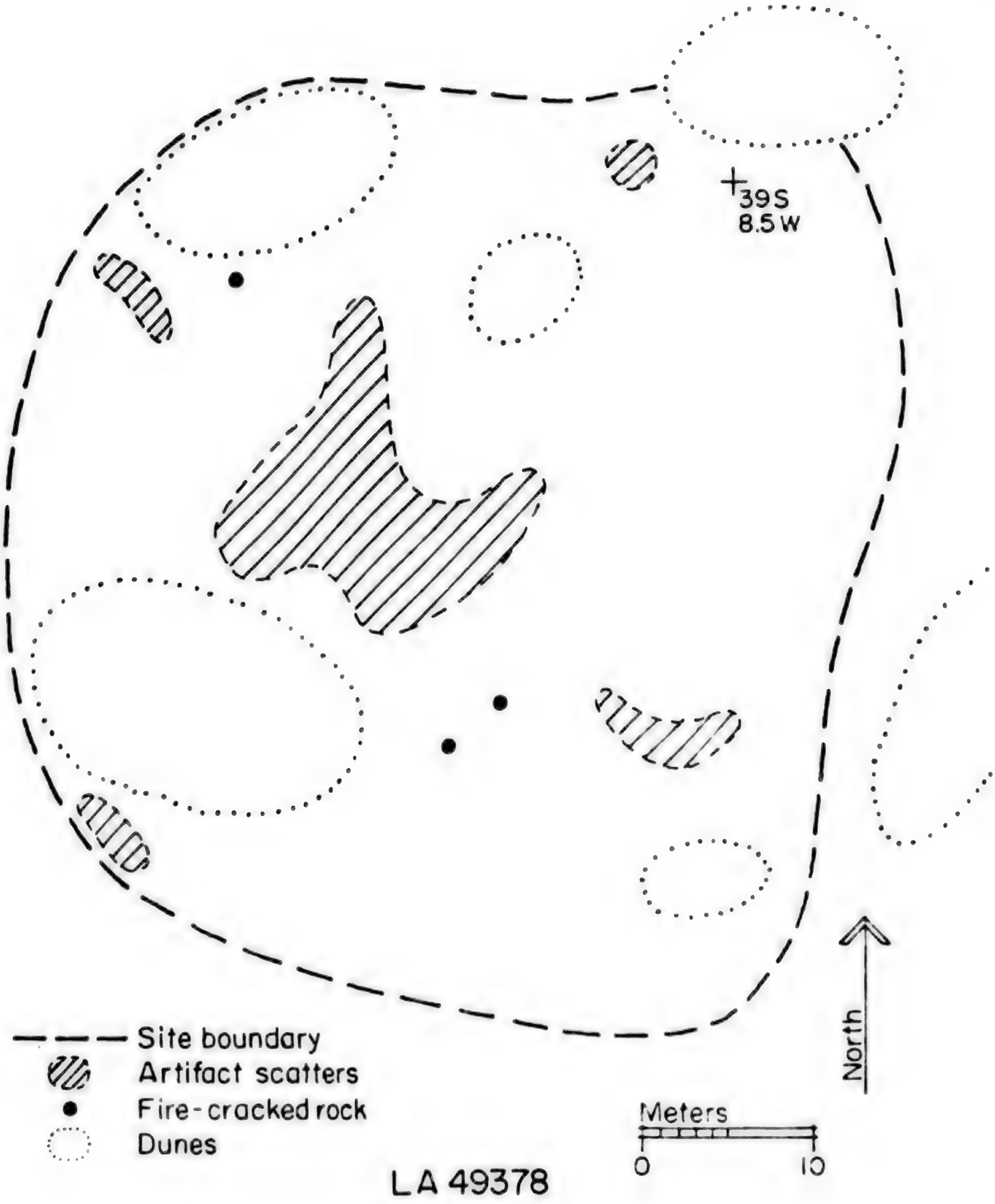


Figure A.60. Site map of LA 49378.

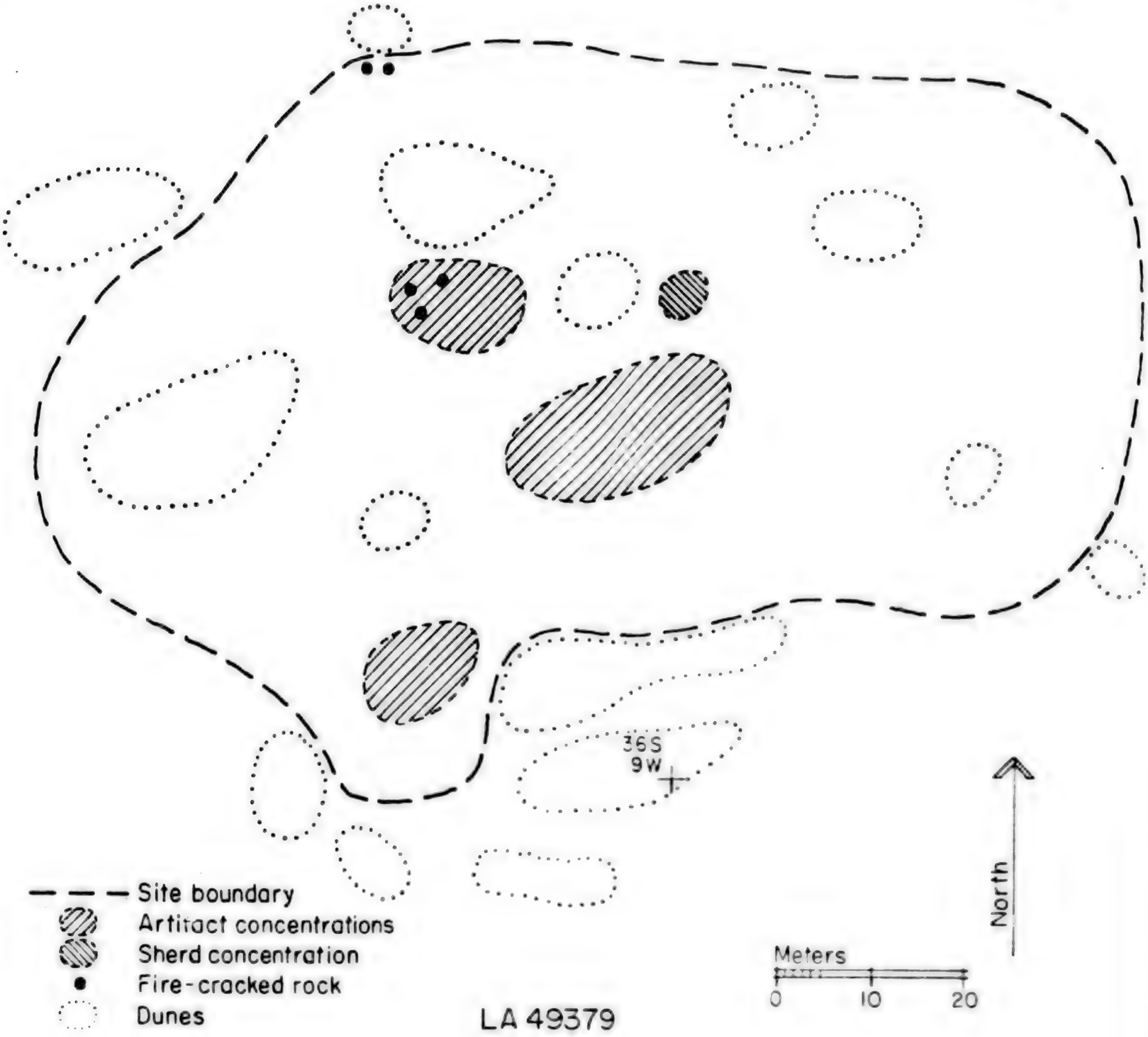


Figure A.61. Site map of LA 49379.

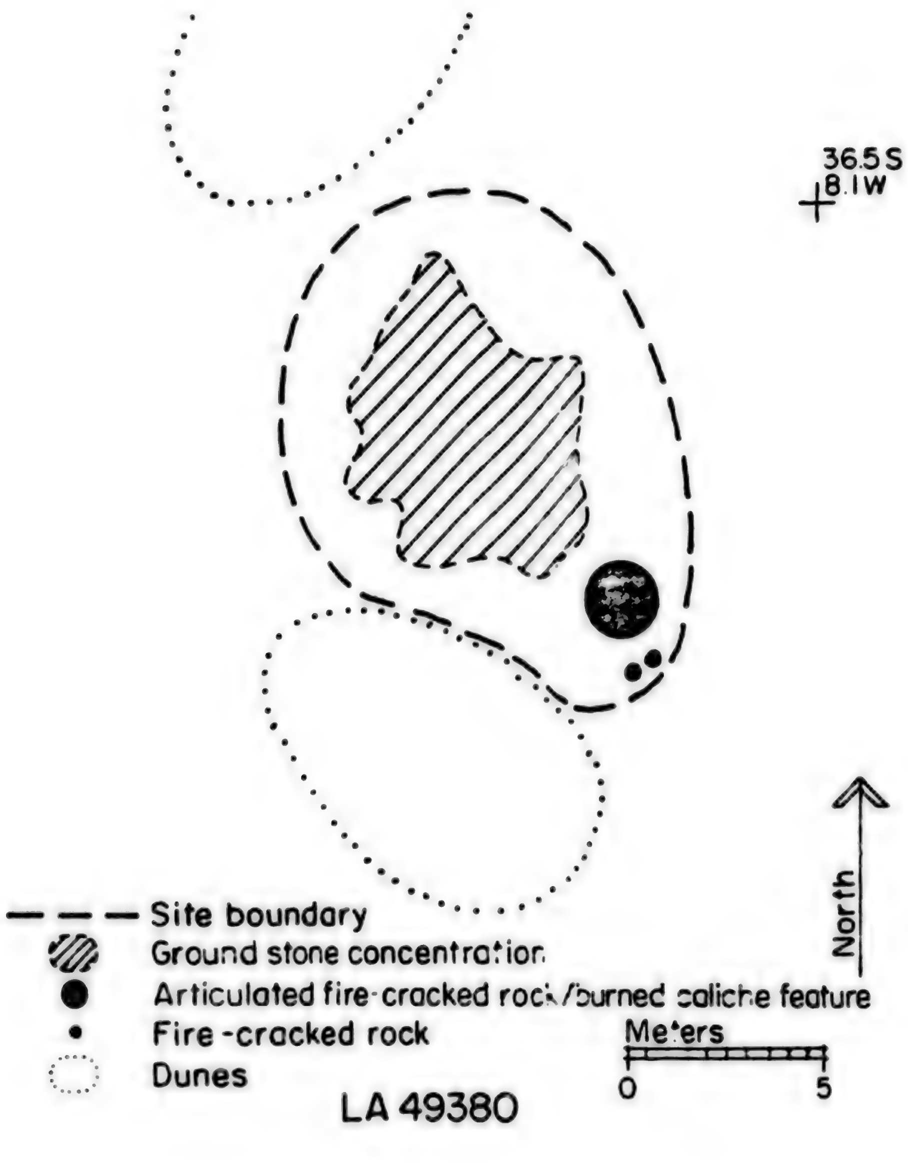

36.5 S
8.1 W
North
Site boundary
Ground stone concentration
Articulated fire-cracked rock/burned caliche feature
Fire-cracked rock
Dunes
Meters
0
5
LA 49380

Figure A.62. Site map of LA 49380.

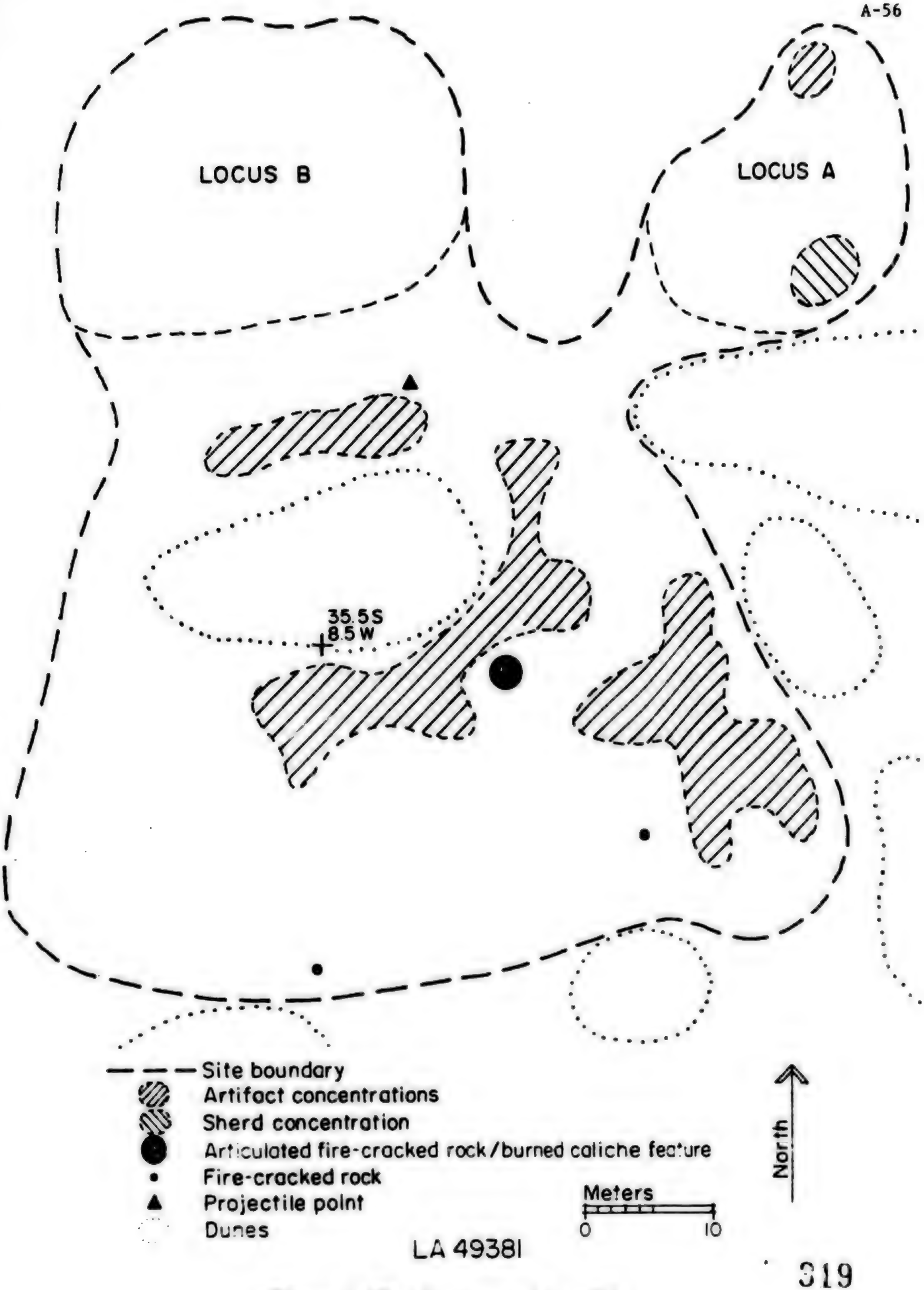
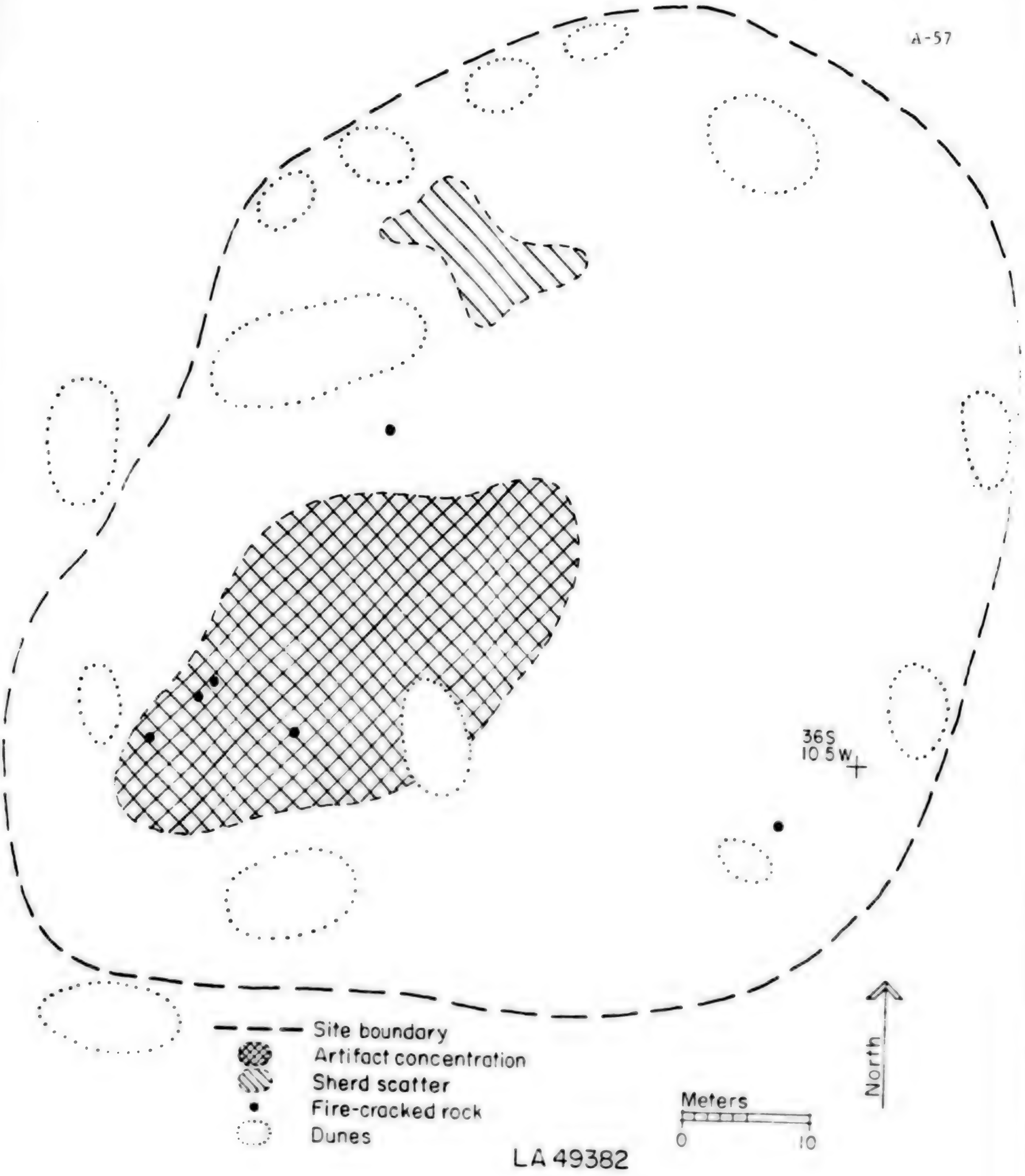


Figure A.63. Site map of LA 49381.



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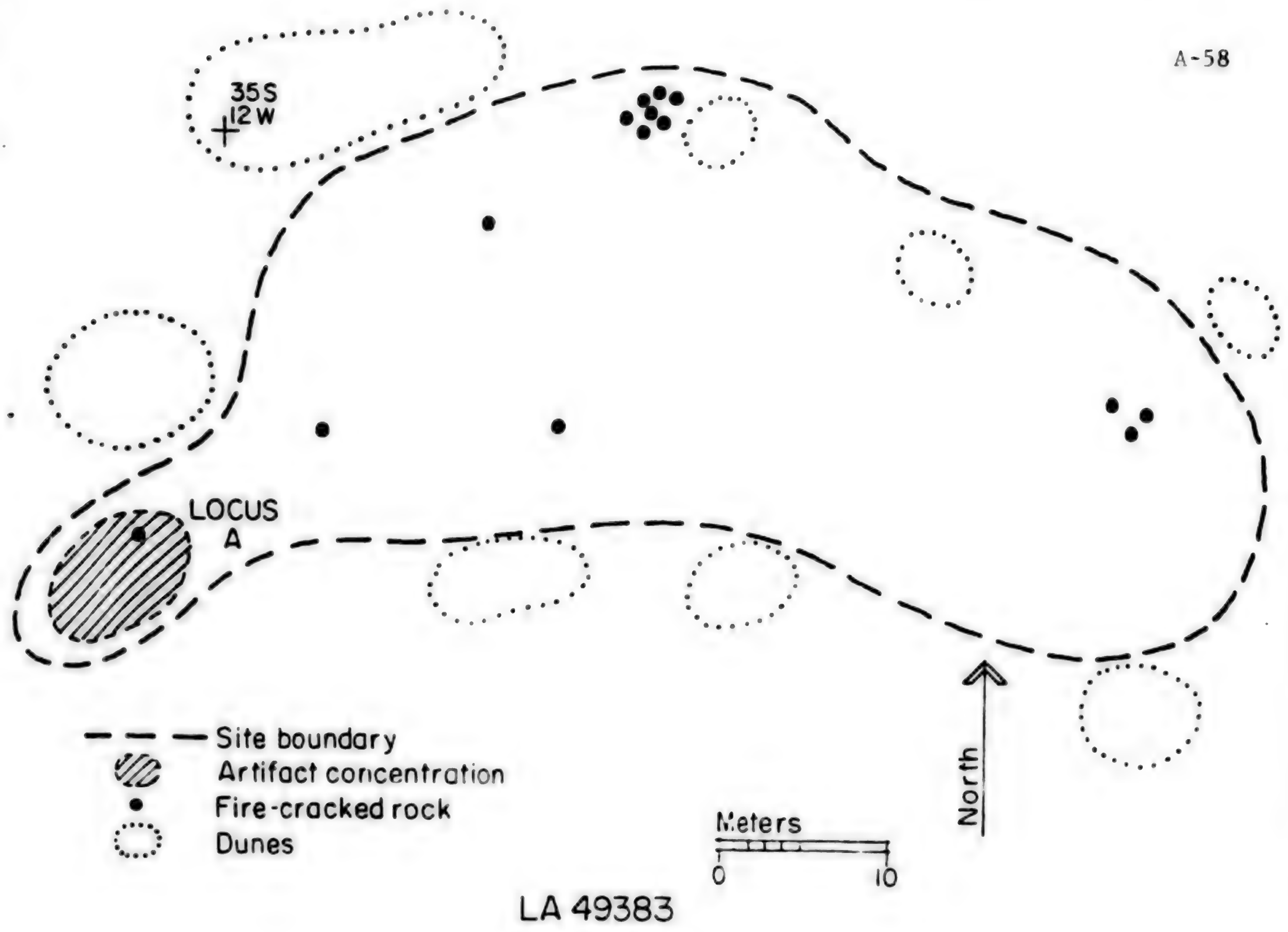
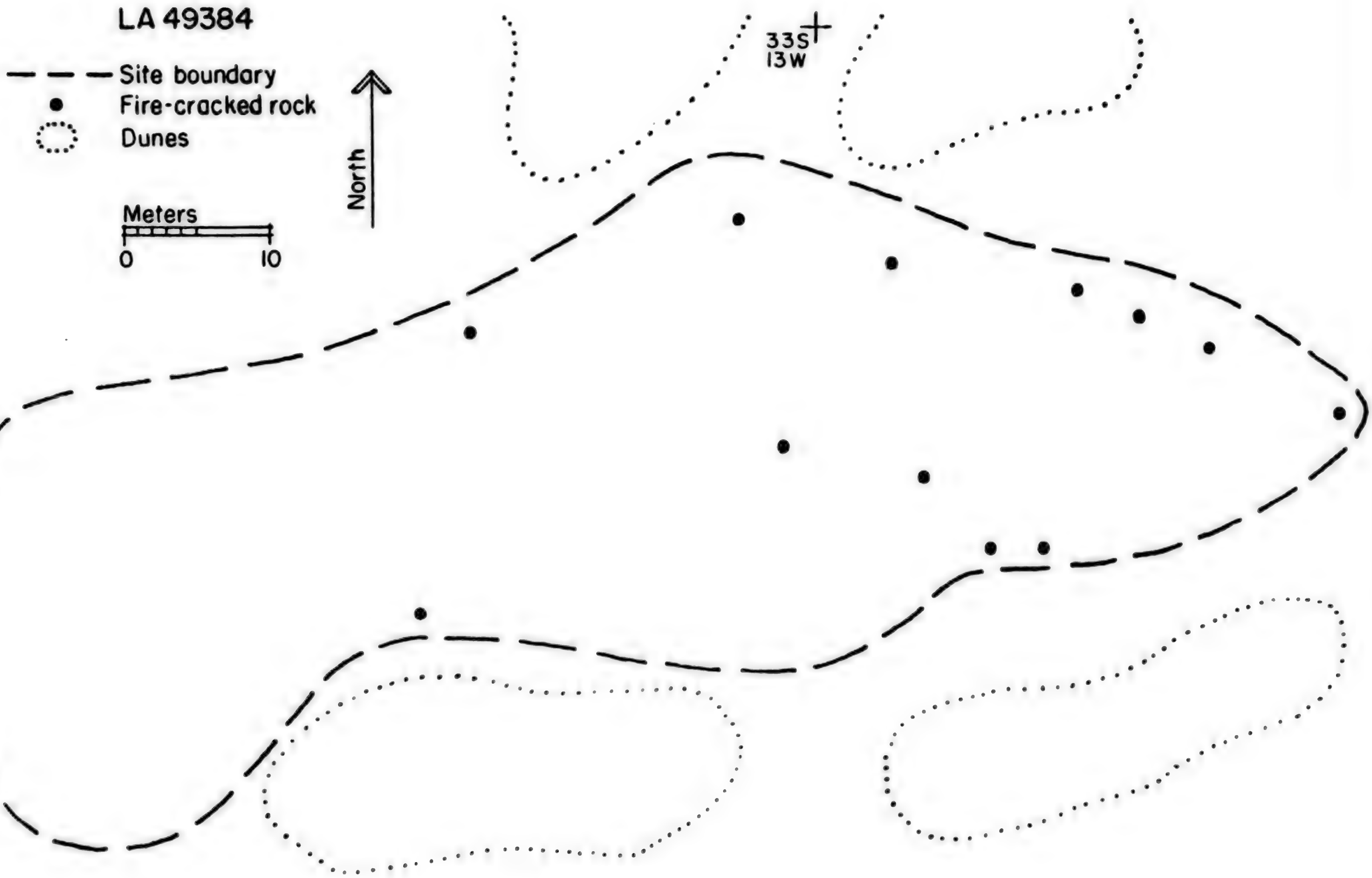


Figure A.65. Site map of LA 49383.



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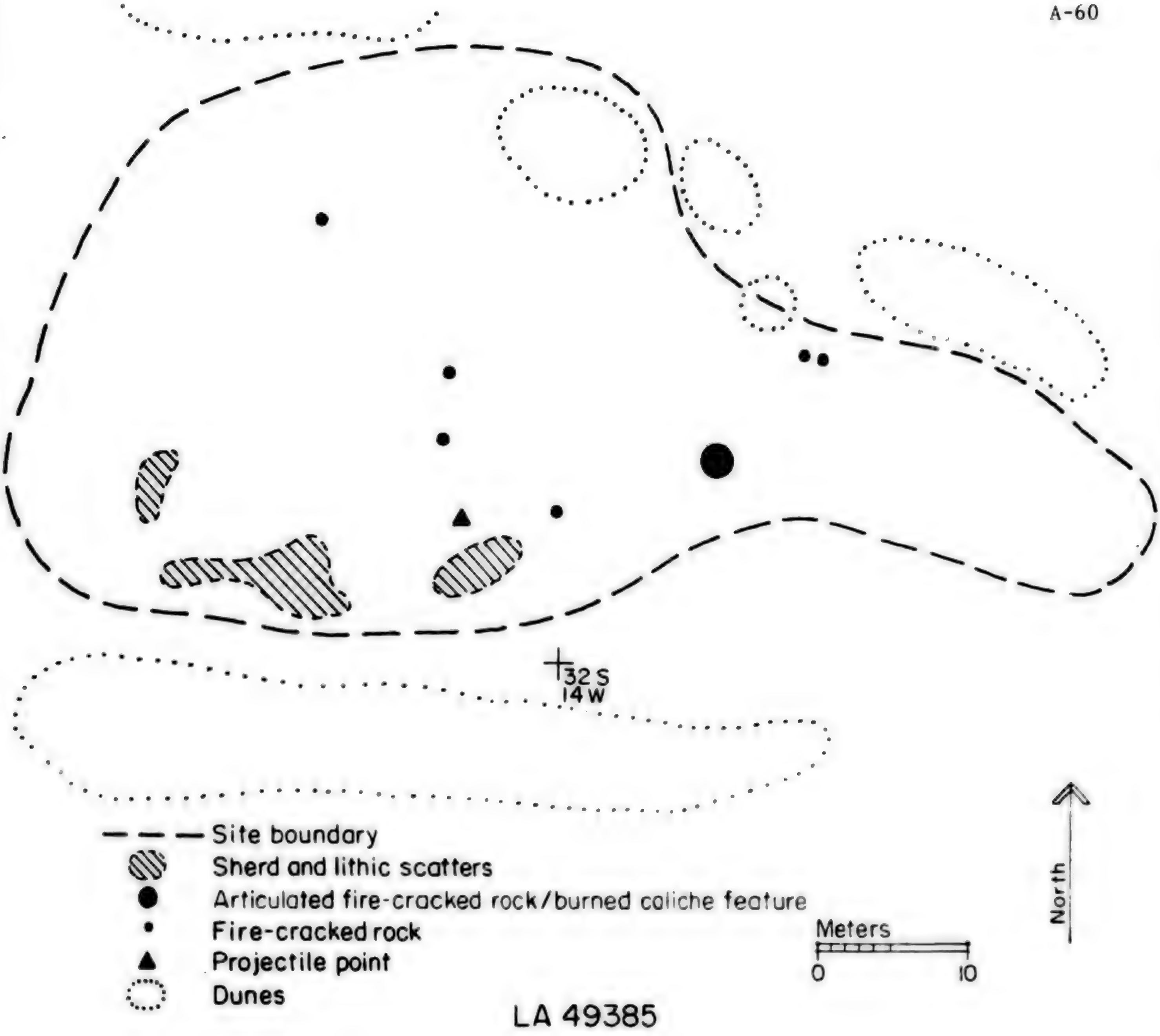

Figure A.67. Site map of LA 49385.

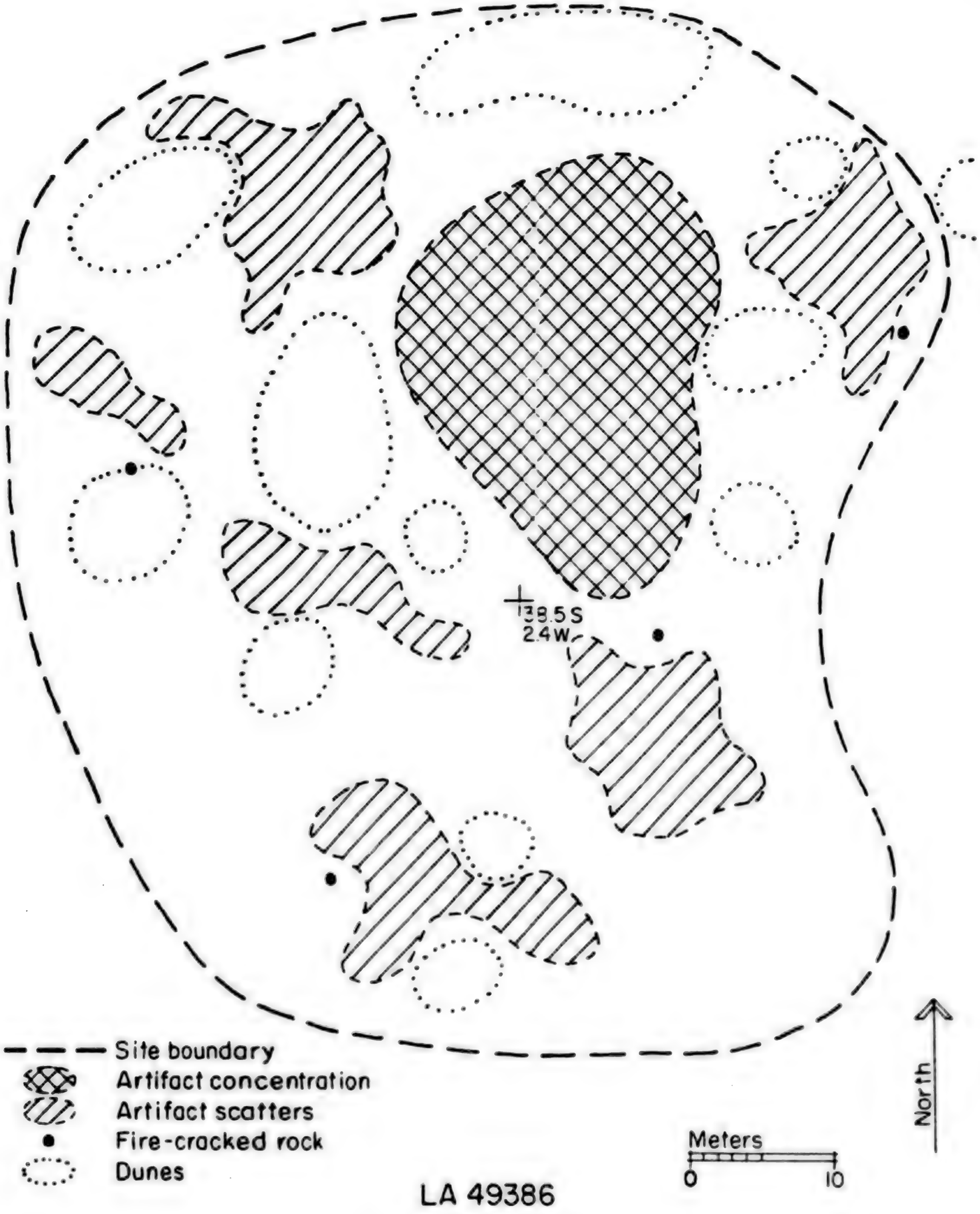

Figure A.68. Site map of LA 49386.

APPENDIX B

J-SCORES

Table B.1

J-SCORES FOR LA 49317

Ceramics J=0.4653

Decorated bowls	3
Decorated jars	17
Undecorated bowls	0
Undecorated jars	65

Ground Stone Tools J=0.5529

Manos	0
Grinding slabs	1
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	4
Ground stone other	1

Chipped Stone Tools J=0.1879

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	5
Projectile points	1

Chipped Stone Artifacts J=0.3905

Cores without cortex	1
Flake Type 1	3
Flake Type 2	39
Flake Type 3	3
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	1
Composite tools	0

Table B.2

J-SCORES FOR LA 49318

Ceramics J=0.1104

Decorated bowls	5
Decorated jars	1
Undecorated bowls	1
Undecorated jars	237

Ground Stone Tools J=0.4681

Manos	2
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	1
Indeterminate ground stone	9
Ground stone other	0

Chipped Stone Tools J=0.4218

Stage biface	0
End scraper	0
Side scraper	2
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	3
Flake with grinding or pecking on dorsal face	3
Projectile points	0

Chipped Stone Artifacts J=0.7639

Cores without cortex	0
Flake Type 1	7
Flake Type 2	11
Flake Type 3	5
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	7
Unknown or other flake type	2
Projectile points	0
Composite tools	0

Table B.3

J-SCORES FOR LA 49319

Ceramics	0	**Chipped Stone Tools**	0

Ground Stone Tools J=0.2277

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	4
Ground stone other	1

Chipped Stone Artifacts J=0.5545

Cores without cortex	0
Flake Type 1	0
Flake Type 2	2
Flake Type 3	0
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.4

J-SCORES FOR LA 49320

Ceramics	0	**Ground Stone Tools**	J=0.0000
		Ground stone other	1

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.4581

Cores without cortex	0
Flake Type 1	1
Flake Type 2	0
Flake Type 3	0
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.5

J-SCORES FOR LA 49321

Ceramics J=0.0000	
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	18

Ground Stone Tools J=0.5529	
Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	1
Indeterminate ground stone	4
Ground stone other	3

Chipped Stone Tools J=0.0000	
Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6981	
Cores without cortex	0
Flake Type 1	10
Flake Type 2	19
Flake Type 3	6
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	8
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	4
Unknown or other flake type	1
Projectile points	0
Composite tools	0

Table B.6

J-SCORES FOR LA 49322

Ceramics J=0.0000

Unspecific jar	1

Ground Stone Tools J=0.4732

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	1
Ground stone other	2

Chipped Stone Tools J=0.0000

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5147

Cores without cortex	0
Flake Type 1	5
Flake Type 2	36
Flake Type 3	7
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	2

Table B.7

J-SCORES FOR LA 49323

Ceramics J=0.2345

Decorated bowls	0
Decorated jars	1
Undecorated bowls	0
Undecorated jars	9

Ground Stone Tools J=0.2559

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	12
Ground stone other	4

Chipped Stone Tools J=0.2891

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	1
Projectile points	1

Chipped Stone Artifacts J=0.6260

Cores without cortex	2
Flake Type 1	5
Flake Type 2	36
Flake Type 3	4
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	2
Projectile points	1
Composite tools	0

Table B.8

J-SCORES FOR LA 49324

Ceramics	0	**Ground Stone Tools**	J=0.0000
		Indeterminate ground stone	1
Chipped Stone Tools	0		
Chipped Stone Artifacts	0		

Table B.9

J-SCORES FOR LA 49325

Ceramics J=0.1686	
Decorated bowls	0
Decorated jars	1
Undecorated bowls	0
Undecorated jars	15

Ground Stone Tools J=0.2576	
Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	10
Ground stone other	1

Chipped Stone Tools J=0.0000	
Stage biface	0
End scraper	1
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6989	
Cores without cortex	0
Flake Type 1	7
Flake Type 2	8
Flake Type 3	1
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	4
Unknown or other flake type	1
Projectile points	0
Composite tools	0

Table B.10

J-SCORES FOR LA 49326

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	37

Ground Stone Tools J=0.6931

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	1
Indeterminate ground stone	3
Ground stone other	2

Chipped Stone Tools J=0.0000

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	1
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6351

Cores without cortex	1
Flake Type 1	3
Flake Type 2	3
Flake Type 3	1
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	2

Table B.11

J-SCORES FOR LA 49327

Ceramics J-0.2750

Decorated bowls	0
Decorated jars	3
Undecorated bowls	2
Undecorated jars	47

Ground Stone Tools J=0.7561

Manos	1
Grinding slabs	1
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	2
Axe	2
Indeterminate ground stone	7
Ground stone other	2

Chipped Stone Tools J=0.6463

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	2
Flake scraper	0
Utilized flake	2
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7906

Cores without cortex	1
Flake Type 1	7
Flake Type 2	23
Flake Type 3	1
Limited-information lithic fragments with cortex	7
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	5
Limited-attribute flake fragment without cortex	10
Unknown or other flake type	3
Projectile points	1
Composite tools	1

Table B.12

J-SCORES FOR LA 49328

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	4

Ground Stone Tools J=0.3914

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	1
Indeterminate ground stone	7
Ground stone other	3

Chipped Stone Tools J=0.5781

Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	1
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.6495

Cores without cortex	3
Flake Type 1	5
Flake Type 2	21
Flake Type 3	6
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	4
Unknown or other flake type	0
Projectile points	1
Composite tools	1

Table B.13

J-SCORES FOR LA 49329

Ceramics J=0.2524

Decorated bowls	1
Decorated jars	3
Undecorated bowls	0
Undecorated jars	41

Ground Stone Tools J=0.2897

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	1
Ground stone other	0

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.4424

Cores without cortex	0
Flake Type 1	4
Flake Type 2	2
Flake Type 3	0
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.14

J-SCORES FOR LA 49330

Ceramics J=0.1290

Decorated bowls	0
Decorated jars	0
Undecorated bowls	1
Undecorated jars	22

Ground Stone Tools J=0.4265

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	1
Indeterminate ground stone	9
Ground stone other	2

Chipped Stone Tools J=0.4582

Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7930

Cores without cortex	0
Flake Type 1	8
Flake Type 2	8
Flake Type 3	6
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	4
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	1
Projectile points	0
Composite tools	0

Table B.15

J-SCORES FOR LA 49331

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	20

Ground Stone Tools J=0.2723

Manos	0
Grinding slabs	0
Basin metate	2
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	5
Ground stone other	0

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.4484

Cores without cortex	0
Flake Type 1	0
Flake Type 2	7
Flake Type 3	3
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.16

J-SCORES FOR LA 49332

Ceramics J=0.1176

Decorated bowls	0
Decorated jars	1
Undecorated bowls	0
Undecorated jars	25

Ground Stone Tools J=0.4325

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	3
Ground stone other	1

Chipped Stone Tools J=0.0000

Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6231

Cores without cortex	0
Flake Type 1	0
Flake Type 2	3
Flake Type 3	1
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	1
Projectile points	0
Composite tools	0

Table B.17

J-SCORES FOR LA 49333

Ceramics J=0.2197

Decorated bowls	1
Decorated jars	0
Undecorated bowls	0
Undecorated jars	10

Ground Stone Tools 0

Chipped Stone Tools 0

Chipped Stone Artifacts 0

Table B.18

J-SCORES FOR LA 49334

Ceramics 0

Ground Stone Tools J=0.2897

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	0
Ground stone other	0

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.7179

Cores without cortex	0
Flake Type 1	2
Flake Type 2	6
Flake Type 3	1
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.19

J-SCORES FOR LA 49335

Ceramics J=0.8387

Decorated bowls	1
Decorated jars	7
Undecorated bowls	2
Undecorated jars	6

Ground Stone Tools J=0.2897

Manos	0
Grinding slabs	1
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	0
Ground stone other	0

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.0000

Flake Type 2	1

Table B.20

J-SCORES FOR LA 49336

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	52

Ground Stone Tools J=0.4173

Manos	4
Grinding slabs	0
Basin metate	1
Trough metate	1
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	35
Ground stone other	9

Chipped Stone Tools J=0.8122

Stage biface	1
End scraper	1
Side scraper	2
End-side scraper	2
Flake scraper	5
Utilized flake	7
Other morphofunctional category	7
Biface form indeterminate	1
Scraper form indeterminate	4
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7637

Cores without cortex	2
Flake Type 1	25
Flake Type 2	33
Flake Type 3	14
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	9
Unknown or other flake type	4
Projectile points	0
Composite tools	5

Table B.21

J-SCORES FOR LA 49337

Ceramics	J=0.0000
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	3

Ground Stone Tools	J=0.6309
Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	1
Ground stone other	1

Chipped Stone Tools	J=0.2654
Stage biface	0
End scraper	0
Side scraper	2
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts	J=0.7289
Cores without cortex	0
Flake Type 1	2
Flake Type 2	6
Flake Type 3	11
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	1
Projectile points	1
Composite tools	0

Table B.22

J-SCORES FOR LA 49338

Ceramics 0

Ground Stone Tools J=0.1787

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	13
Ground stone other	2

Chipped Stone Tools J=0.5059

Stage biface	0
End scraper	1
Side scraper	2
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	4

Chipped Stone Artifacts J=0.7643

Cores without cortex	0
Flake Type 1	2
Flake Type 2	13
Flake Type 3	3
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	0
Projectile points	4
Composite tools	1

Table B.23

J-SCORES FOR LA 49339

Ceramics J=0.2698

Decorated bowls	0
Decorated jars	0
Undecorated bowls	11
Undecorated jars	78

Ground Stone Tools J=0.6804

Manos	8
Grinding slabs	13
Basin metate	1
Trough metate	5
Pestle	1
Pounding implements	6
Axe	1
Indeterminate ground stone	56
Ground stone other	13

Chipped Stone Tools J=0.8279

Stage biface	1
End scraper	1
Side scraper	8
End-side scraper	1
Flake scraper	9
Utilized flake	3
Other morphofunctional category	1
Biface form indeterminate	1
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	2
Projectile points	2

Chipped Stone Artifacts J=0.7706

Cores without cortex	2
Flake Type 1	13
Flake Type 2	34
Flake Type 3	23
Limited-information lithic fragments with cortex	8
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	3
Unknown or other flake type	2
Projectile points	2
Composite tools	5

Table B.24

J-SCORES FOR LA 49340

Ceramics J=0.0000	
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	2

Ground Stone Tools J=0.6534	
Manos	0
Grinding slabs	3
Basin metate	1
Trough metate	0
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	6
Ground stone other	6

Chipped Stone Tools J=0.5556	
Stage biface	0
End scraper	1
Side scraper	0
End-side scraper	1
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	2

Chipped Stone Artifacts J=0.7382	
Cores without cortex	2
Flake Type 1	7
Flake Type 2	20
Flake Type 3	17
Limited-information lithic fragments with cortex	7
Limited-information lithic fragments without cortex	5
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	2
Composite tools	1

Table B.25

J-SCORES FOR LA 49341

Ceramics J=0.6584

Decorated bowls	27
Decorated jars	97
Undecorated bowls	0
Undecorated jars	161

Ground Stone Tools J=0.7087

Manos	1
Grinding slabs	0
Basin metate	2
Trough metate	2
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	3
Ground stone other	2

Chipped Stone Tools J=0.2891

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5059

Cores without cortex	0
Flake Type 1	1
Flake Type 2	17
Flake Type 3	5
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.26

J-SCORES FOR LA 49342

Ceramics J=0.6545	
Decorated bowls	30
Decorated jars	40
Undecorated bowls	0
Undecorated jars	121

Ground Stone Tools J=0.3018	
Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	1
Indeterminate ground stone	18
Ground stone other	2

Chipped Stone Tools J=0.4582	
Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6927	
Cores without cortex	3
Flake Type 1	6
Flake Type 2	15
Flake Type 3	5
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.27

J-SCORES FOR LA 49343

Ceramics J=0.2069

Decorated bowls	0
Decorated jars	0
Undecorated bowls	1
Undecorated jars	11

Ground Stone Tools J=0.4087

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	1
Axe	1
Indeterminate ground stone	17
Ground stone other	3

Chipped Stone Tools J=0.5916

Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	3
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	4

Chipped Stone Artifacts J=0.8522

Cores without cortex	5
Flake Type 1	8
Flake Type 2	16
Flake Type 3	2
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	7
Limited-attribute flake fragment without cortex	14
Unknown or other flake type	0
Projectile points	4
Composite tools	1

Table B.28

J-SCORES FOR LA 49344

Ceramics J=0.6085

Decorated bowls	0
Decorated jars	34
Undecorated bowls	3
Undecorated jars	29

Ground Stone Tools J=0.3763

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	3
Axe	1
Indeterminate ground stone	20
Ground stone other	1

Chipped Stone Tools J=0.2574

Stage biface	0
End scraper	0
Side scraper	4
End-side scraper	0
Flake scraper	0
Utilized flake	9
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7298

Cores without cortex	0
Flake Type 1	12
Flake Type 2	21
Flake Type 3	11
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.29

J-SCORES FOR LA 49345

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	6

Ground Stone Tools J=0.4823

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	11
Ground stone other	5

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.7166

Cores without cortex	1
Flake Type 1	14
Flake Type 2	22
Flake Type 3	6
Limited-information lithic fragments with cortex	8
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.30

J-SCORES FOR LA 49346

Ceramics J=0.2787

Decorated bowls	0
Decorated jars	13
Undecorated bowls	0
Undecorated jars	87

Ground Stone Tools J=0.5942

Manos	3
Grinding slabs	0
Basin metate	2
Trough metate	0
Pestle	0
Pounding implements	5
Axe	0
Indeterminate ground stone	18
Ground stone other	6

Chipped Stone Tools J=0.4336

Stage biface	0
End scraper	2
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	1
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6737

Cores without cortex	3
Flake Type 1	13
Flake Type 2	26
Flake Type 3	9
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.31

J-SCORES FOR LA 49347

Ceramics J=0.3361

Decorated bowls	0
Decorated jars	3
Undecorated bowls	0
Undecorated jars	14

Ground Stone Tools J=0.4783

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	3
Axe	1
Indeterminate ground stone	26
Ground stone other	9

Chipped Stone Tools J=0.5326

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	1
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	3
Flake with grinding or pecking on dorsal face	0
Projectile points	2

Chipped Stone Artifacts J=0.8524

Cores without cortex	2
Flake Type 1	7
Flake Type 2	17
Flake Type 3	9
Limited-information lithic fragments with cortex	13
Limited-information lithic fragments without cortex	6
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	4
Projectile points	2
Composite tools	2

Table B.32

J-SCORES FOR LA 49348

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	18

Ground Stone Tools J=0.6449

Manos	3
Grinding slabs	1
Basin metate	5
Trough metate	1
Pestle	0
Pounding implements	5
Axe	1
Indeterminate ground stone	32
Ground stone other	10

Chipped Stone Tools J=0.6351

Stage biface	0
End scraper	0
Side scraper	3
End-side scraper	1
Flake scraper	0
Utilized flake	0
Other morphofunctional category	2
Biface form indeterminate	0
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7687

Cores without cortex	2
Flake Type 1	2
Flake Type 2	24
Flake Type 3	12
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	8
Limited-attribute flake fragment with cortex	5
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	1
Projectile points	1
Composite tools	0

Table B.33

J-SCORES FOR LA 49349

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	4

Ground Stone Tools J=0.7039

Manos	0
Grinding slabs	0
Basin metate	1
Trough metate	3
Pestle	0
Pounding implements	3
Axe	1
Indeterminate ground stone	6
Ground stone other	8

Chipped Stone Tools J=0.2891

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.6653

Cores without cortex	0
Flake Type 1	9
Flake Type 2	28
Flake Type 3	4
Limited-information lithic fragments with cortex	9
Limited-information lithic fragments without cortex	5
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	1
Projectile points	1
Composite tools	0

Table B.34

J-SCORES FOR LA 49350

Ceramics J=0.2687

Decorated bowls	0
Decorated jars	7
Undecorated bowls	0
Undecorated jars	50

Ground Stone Tools J=0.5966

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	3
Ground stone other	2

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.6320

Cores without cortex	0
Flake Type 1	11
Flake Type 2	3
Flake Type 3	4
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.35

J-SCORES FOR LA 49351

Ceramics J=0.5000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	1
Undecorated jars	1

Ground Stone Tools J=0.6420

Manos	1
Grinding slabs	1
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	7
Ground stone other	1

Chipped Stone Tools J=0.5174

Stage biface	0
End scraper	0
Side scraper	2
End-side scraper	0
Flake scraper	0
Utilized flake	5
Other morphofunctional category	0
Biface form indeterminate	3
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7402

Cores without cortex	1
Flake Type 1	5
Flake Type 2	37
Flake Type 3	12
Limited-information lithic fragments with cortex	10
Limited-information lithic fragments without cortex	8
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	4
Unknown or other flake type	2
Projectile points	1
Composite tools	2

Table B.36

J-SCORES FOR LA 49352

Ceramics J=0.4015

Decorated bowls	2
Decorated jars	1
Undecorated bowls	0
Undecorated jars	15

Ground Stone Tools J=0.5406

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	2
Indeterminate ground stone	14
Ground stone other	5

Chipped Stone Tools J=0.5795

Stage biface	0
End scraper	0
Side scraper	4
End-side scraper	1
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	4
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.6964

Cores without cortex	0
Flake Type 1	4
Flake Type 2	29
Flake Type 3	20
Limited-information lithic fragments with cortex	5
Limited-information lithic fragments without cortex	11
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	3
Unknown or other flake type	0
Projectile points	1
Composite tools	1

Table B.37

J-SCORES FOR LA 49353

Ceramics J=0.6029	
Decorated bowls	6
Decorated jars	35
Undecorated bowls	1
Undecorated jars	76

Ground Stone Tools J=0.3637	
Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	1
Pounding implements	0
Axe	1
Indeterminate ground stone	21
Ground stone other	1

Chipped Stone Tools J=0.2764	
Stage biface	0
End scraper	1
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	2
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5480	
Cores without cortex	0
Flake Type 1	33
Flake Type 2	82
Flake Type 3	32
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	3
Projectile points	2
Composite tools	1

Table B.38

J-SCORES FOR LA 49354

Ceramics 0

Ground Stone Tools J=0.2827

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	11
Ground stone other	5

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.6156

Cores without cortex	0
Flake Type 1	9
Flake Type 2	67
Flake Type 3	26
Limited-information lithic fragments with cortex	10
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	6
Limited-attribute flake fragment without cortex	3
Unknown or other flake type	0
Projectile points	4
Composite tools	0

Table B.39

J-SCORES FOR LA 49355

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	9

Ground Stone Tools J=0.7853

Manos	7
Grinding slabs	9
Basin metate	6
Trough metate	3
Pestle	0
Pounding implements	5
Axe	0
Indeterminate ground stone	25
Ground stone other	9

Chipped Stone Tools J=0.6908

Stage biface	0
End scraper	1
Side scraper	2
End-side scraper	0
Flake scraper	0
Utilized flake	4
Other morphofunctional category	3
Biface form indeterminate	4
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7084

Cores without cortex	2
Flake Type 1	85
Flake Type 2	214
Flake Type 3	137
Limited-information lithic fragments with cortex	49
Limited-information lithic fragments without cortex	54
Limited-attribute flake fragment with cortex	7
Limited-attribute flake fragment without cortex	24
Unknown or other flake type	1
Projectile points	1
Composite tools	7

Table B.40

J-SCORES FOR LA 49356

Ceramics J=0.6781

Decorated bowls	6
Decorated jars	17
Undecorated bowls	1
Undecorated jars	39

Ground Stone Tools J=0.4317

Manos	1
Grinding slabs	0
Basin metate	1
Trough metate	2
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	16
Ground stone other	0

Chipped Stone Tools J=0.5939

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	2
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	3
Scraper form indeterminate	5
Flake with grinding or pecking on dorsal face	1
Projectile points	0

Chipped Stone Artifacts J=0.7767

Cores without cortex	0
Flake Type 1	21
Flake Type 2	30
Flake Type 3	20
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	8
Limited-attribute flake fragment without cortex	11
Unknown or other flake type	4
Projectile points	0
Composite tools	1

Table B.41

J-SCORES FOR LA 49357

Ceramics J=0.4492

Decorated bowls	4
Decorated jars	12
Undecorated bowls	0
Undecorated jars	62

Ground Stone Tools J=0.5390

Manos	10
Grinding slabs	5
Basin metate	8
Trough metate	0
Pestle	0
Pounding implements	5
Axe	3
Indeterminate ground stone	78
Ground stone other	19

Chipped Stone Tools J=0.7931

Stage biface	1
End scraper	0
Side scraper	3
End-side scraper	2
Flake scraper	0
Utilized flake	12
Other morphofunctional category	2
Biface form indeterminate	3
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	4
Projectile points	2

Chipped Stone Artifacts J=0.7682

Cores without cortex	17
Flake Type 1	22
Flake Type 2	48
Flake Type 3	16
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	3
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	4
Projectile points	2
Composite tools	12

Table B.42

J-SCORES FOR LA 49358

Ceramics J=0.0000	
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	8

Ground Stone Tools J=0.5229	
Manos	7
Grinding slabs	1
Basin metate	1
Trough metate	2
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	29
Ground stone other	1

Chipped Stone Tools J=0.5939	
Stage biface	1
End scraper	0
Side scraper	3
End-side scraper	0
Flake scraper	1
Utilized flake	2
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	5

Chipped Stone Artifacts J=0.7655	
Cores without cortex	0
Flake Type 1	46
Flake Type 2	107
Flake Type 3	101
Limited-information lithic fragments with cortex	33
Limited-information lithic fragments without cortex	26
Limited-attribute flake fragment with cortex	16
Limited-attribute flake fragment without cortex	43
Unknown or other flake type	3
Projectile points	5
Composite tools	0

Table B.43

J-SCORES FOR LA 49359

Ceramics J=0.4191

Decorated bowls	0
Decorated jars	11
Undecorated bowls	1
Undecorated jars	44

Ground Stone Tools J=0.2548

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	19
Ground stone other	3

Chipped Stone Tools J=0.4582

Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	1
Projectile points	1

Chipped Stone Artifacts J=0.7582

Cores without cortex	2
Flake Type 1	6
Flake Type 2	17
Flake Type 3	7
Limited-information lithic fragments with cortex	12
Limited-information lithic fragments without cortex	10
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	3
Unknown or other flake type	0
Projectile points	1
Composite tools	0

Table B.44

J-SCORES FOR LA 49360

Ceramics J=0.5236	
Decorated bowls	14
Decorated jars	6
Undecorated bowls	0
Undecorated jars	58

Ground Stone Tools J=0.6309	
Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	4
Ground stone other	1

Chipped Stone Tools J=0.0000	
Stage biface	0
End scraper	0
Side scraper	4
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6564	
Cores without cortex	0
Flake Type 1	6
Flake Type 2	11
Flake Type 3	3
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	0
Projectile points	0
Composite tools	2

Table B.45

J-SCORES FOR LA 49361

Ceramics J=0.0000	
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	1

Ground Stone Tools J=0.4682	
Manos	3
Grinding slabs	0
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	5
Axe	0
Indeterminate ground stone	41
Ground stone other	10

Chipped Stone Tools J=0.3986	
Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	2
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	4
Projectile points	0

Chipped Stone Artifacts J=0.6027	
Cores without cortex	3
Flake Type 1	8
Flake Type 2	29
Flake Type 3	0
Limited-information lithic fragments with cortex	5
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	1
Projectile points	0
Composite tools	3

Table B.46

J-SCORES FOR LA 49362

Ceramics J=0.1432	
Decorated bowls	1
Decorated jars	0
Undecorated bowls	0
Undecorated jars	19

Ground Stone Tools J=0.3908	
Manos	4
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	8
Ground stone other	0

Chipped Stone Tools J=0.4582	
Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6777	
Cores without cortex	0
Flake Type 1	12
Flake Type 2	14
Flake Type 3	5
Limited-information lithic fragments with cortex	5
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.47

J-SCORES FOR LA 49363

Ceramics 0

Ground Stone Tools J=0.6214

Manos	3
Grinding slabs	2
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	4
Ground stone other	9

Chipped Stone Tools J=0.4582

Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5545

Cores without cortex	2
Flake Type 1	0
Flake Type 2	1
Flake Type 3	0
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	2
Projectile points	0
Composite tools	1

Table B.48

J-SCORES FOR LA 49364

Ceramics J=0.7855

Decorated bowls	2
Decorated jars	1
Undecorated bowls	1
Undecorated jars	6

Ground Stone Tools J=0.7056

Manos	11
Grinding slabs	41
Basin metate	10
Trough metate	15
Pestle	9
Pounding implements	31
Axe	2
Indeterminate ground stone	175
Ground stone other	37

Chipped Stone Tools J=0.8083

Stage biface	0
End scraper	2
Side scraper	3
End-side scraper	0
Flake scraper	3
Utilized flake	14
Other morphofunctional category	2
Biface form indeterminate	2
Scraper form indeterminate	4
Flake with grinding or pecking on dorsal face	6
Projectile points	3

Chipped Stone Artifacts J=0.8057

Cores without cortex	8
Flake Type 1	15
Flake Type 2	56
Flake Type 3	4
Limited-information lithic fragments with cortex	9
Limited-information lithic fragments without cortex	12
Limited-attribute flake fragment with cortex	4
Limited-attribute flake fragment without cortex	9
Unknown or other flake type	3
Projectile points	3
Composite tools	9

Table B.49

J-SCORES FOR LA 49365

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	4
Undecorated bowls	0
Undecorated jars	0

Ground Stone Tools J=0.7098

Manos	1
Grinding slabs	1
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	8
Axe	1
Indeterminate ground stone	2
Ground stone other	1

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.6590

Cores without cortex	0
Flake Type 1	7
Flake Type 2	3
Flake Type 3	4
Limited-information lithic fragments with cortex	9
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.50

J-SCORES FOR LA 49366

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	9

Ground Stone Tools J=0.5325

Manos	0
Grinding slabs	0
Basin metate	1
Trough metate	1
Pestle	0
Pounding implements	0
Axe	1
Indeterminate ground stone	9
Ground stone other	3

Chipped Stone Tools J=0.2654

Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	2
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7837

Cores without cortex	2
Flake Type 1	11
Flake Type 2	16
Flake Type 3	2
Limited-information lithic fragments with cortex	6
Limited-information lithic fragments without cortex	7
Limited-attribute flake fragment with cortex	4
Limited-attribute flake fragment without cortex	7
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.51

J-SCORES FOR LA 49367

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	15

Ground Stone Tools J=0.2559

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	3
Ground stone other	1

Chipped Stone Tools J=0.3010

Stage biface	0
End scraper	1
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6351

Cores without cortex	0
Flake Type 1	2
Flake Type 2	3
Flake Type 3	1
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.52

J-SCORES FOR LA 49368

Ceramics J=0.1651

Decorated bowls	1
Decorated jars	3
Undecorated bowls	0
Undecorated jars	75

Ground Stone Tools J=0.3348

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	6
Ground stone other	1

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.7149

Cores without cortex	0
Flake Type 1	10
Flake Type 2	18
Flake Type 3	4
Limited-information lithic fragments with cortex	3
Limited-information lithic fragments without cortex	5
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	9
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.53

J-SCORES FOR LA 49369

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	3

Ground Stone Tools J=0.4575

Manos	0
Grinding slabs	1
Basin metate	1
Trough metate	1
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	28
Ground stone other	6

Chipped Stone Tools J=0.0000

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	5
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6820

Cores without cortex	3
Flake Type 1	11
Flake Type 2	30
Flake Type 3	0
Limited-information lithic fragments with cortex	9
Limited-information lithic fragments without cortex	9
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.54

J-SCORES FOR LA 49370

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	5

Ground Stone Tools J=0.2908

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	8
Ground stone other	0

Chipped Stone Tools J=0.0000

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	1
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.6822

Cores without cortex	0
Flake Type 1	2
Flake Type 2	20
Flake Type 3	7
Limited-information lithic fragments with cortex	6
Limited-information lithic fragments without cortex	13
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.55

J-SCORES FOR LA 49371

Ceramics J=0.0000	
Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	3

Ground Stone Tools J=0.6186	
Manos	1
Grinding slabs	0
Basin metate	1
Trough metate	1
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	5
Ground stone other	2

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.2654	
Cores without cortex	0
Flake Type 1	0
Flake Type 2	0
Flake Type 3	0
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.56

J-SCORES FOR LA 49372

Ceramics J=0.0348

Decorated bowls	0
Decorated jars	1
Undecorated bowls	0
Undecorated jars	119

Ground Stone Tools J=0.4008

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	8
Axe	4
Indeterminate ground stone	59
Ground stone other	11

Chipped Stone Tools J=0.6645

Stage biface	0
End scraper	3
Side scraper	5
End-side scraper	3
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	1
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7749

Cores without cortex	5
Flake Type 1	13
Flake Type 2	27
Flake Type 3	12
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	3
Limited-attribute flake fragment without cortex	12
Unknown or other flake type	2
Projectile points	1
Composite tools	6

Table B.57

J-SCORES FOR LA 49374

Ceramics J=0.1686

Decorated bowls	0
Decorated jars	0
Undecorated bowls	1
Undecorated jars	15

Ground Stone Tools J=0.5956

Manos	2
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	3
Axe	0
Indeterminate ground stone	2
Ground stone other	5

Chipped Stone Tools 0

Chipped Stone Artifacts J=0.5979

Cores without cortex	0
Flake Type 1	2
Flake Type 2	18
Flake Type 3	6
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	7
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.58

J-SCORES FOR LA 49376

Ceramics 0

Ground Stone Tools J=0.2917

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	35
Ground stone other	8

Chipped Stone Tools J=0.4513

Stage biface	0
End scraper	3
Side scraper	3
End-side scraper	2
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5982

Cores without cortex	0
Flake Type 1	13
Flake Type 2	29
Flake Type 3	3
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	1
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	8
Unknown or other flake type	1
Projectile points	0
Composite tools	1

Table B.59

J-SCORES FOR LA 49377

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	1

Ground Stone Tools J=0.4840

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	1
Pestle	0
Pounding implements	1
Axe	1
Indeterminate ground stone	16
Ground stone other	3

Chipped Stone Tools J=0.6603

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	1
Utilized flake	5
Other morphofunctional category	1
Biface form indeterminate	1
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	2
Projectile points	0

Chipped Stone Artifacts J=0.8320

Cores without cortex	0
Flake Type 1	13
Flake Type 2	17
Flake Type 3	6
Limited-information lithic fragments with cortex	17
Limited-information lithic fragments without cortex	11
Limited-attribute flake fragment with cortex	10
Limited-attribute flake fragment without cortex	5
Unknown or other flake type	0
Projectile points	0
Composite tools	7

Table B.60

J-SCORES FOR LA 49378

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	1

Ground Stone Tools J=0.2764

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	2
Axe	0
Indeterminate ground stone	4
Ground stone other	0

Chipped Stone Tools J=0.0000

Side scraper	1

Chipped Stone Artifacts J=0.5659

Cores without cortex	0
Flake Type 1	5
Flake Type 2	8
Flake Type 3	7
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	10
Unknown or other flake type	0
Projectile points	0
Composite tools	0

Table B.61

J-SCORES FOR LA 49379

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	56

Ground Stone Tools J=0.5892

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	8
Axe	0
Indeterminate ground stone	6
Ground stone other	6

Chipped Stone Tools J=0.6351

Stage biface	0
End scraper	2
Side scraper	3
End-side scraper	2
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J-0.7176

Cores without cortex	2
Flake Type 1	8
Flake Type 2	27
Flake Type 3	10
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	7
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	1
Unknown or other flake type	1
Projectile points	1
Composite tools	1

Table B.62

J-SCORES FOR LA 49380

Ceramics 0

Ground Stone Tools J=0.1234

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	12
Ground stone other	0

Chipped Stone Tools J=0.2891

Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	0
Flake scraper	0
Utilized flake	1
Other morphofunctional category	1
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.5509

Cores without cortex	0
Flake Type 1	0
Flake Type 2	3
Flake Type 3	0
Limited-information lithic fragments with cortex	1
Limited-information lithic fragments without cortex	2
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	2

Table B.63

J-SCORES FOR LA 49381

Ceramics	J=0.2197
Decorated bowls	0
Decorated jars	2
Undecorated bowls	0
Undecorated jars	20

Ground Stone Tools	J=0.6493
Manos	0
Grinding slabs	0
Basin metate	3
Trough metate	1
Pestle	0
Pounding implements	2
Axe	14
Indeterminate ground stone	4
Ground stone other	3

Chipped Stone Tools	J=0.9024
Stage biface	1
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	1
Utilized flake	1
Other morphofunctional category	1
Biface form indeterminate	1
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts	J=0.7110
Cores without cortex	1
Flake Type 1	27
Flake Type 2	70
Flake Type 3	22
Limited-information lithic fragments with cortex	7
Limited-information lithic fragments without cortex	7
Limited-attribute flake fragment with cortex	6
Limited-attribute flake fragment without cortex	14
Unknown or other flake type	0
Projectile points	1
Composite tools	4

Table B.64

J-SCORES FOR LA 49382

Ceramics J=0.3919

Decorated bowls	0
Decorated jars	7
Undecorated bowls	0
Undecorated jars	23

Ground Stone Tools J=0.3749

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	1
Axe	0
Indeterminate ground stone	12
Ground stone other	7

Chipped Stone Tools J=0.7072

Stage biface	0
End scraper	0
Side scraper	3
End-side scraper	0
Flake scraper	0
Utilized flake	2
Other morphofunctional category	1
Biface form indeterminate	0
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	1
Projectile points	1

Chipped Stone Artifacts J=0.6378

Cores without cortex	2
Flake Type 1	12
Flake Type 2	29
Flake Type 3	5
Limited-information lithic fragments with cortex	0
Limited-information lithic fragments without cortex	0
Limited-attribute flake fragment with cortex	2
Limited-attribute flake fragment without cortex	11
Unknown or other flake type	0
Projectile points	1
Composite tools	1

Table B.65

J-SCORES FOR LA 49383

Ceramics 0

Ground Stone Tools 0.4469

Manos	0
Grinding slabs	0
Basin metate	0
Trough metate	2
Pestle	0
Pounding implements	5
Axe	0
Indeterminate ground stone	22
Ground stone other	4

Chipped Stone Tools J=0.4336

Stage biface	0
End scraper	0
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	2
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7020

Cores without cortex	0
Flake Type 1	9
Flake Type 2	22
Flake Type 3	10
Limited-information lithic fragments with cortex	5
Limited-information lithic fragments without cortex	12
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	0
Unknown or other flake type	0
Projectile points	0
Composite tools	1

Table B.66

J-SCORES FOR LA 49384

Ceramics J=0.0000

Decorated bowls	0
Decorated jars	0
Undecorated bowls	0
Undecorated jars	37

Ground Stone Tools J=0.4921

Manos	1
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	9
Axe	1
Indeterminate ground stone	26
Ground stone other	6

Chipped Stone Tools J=0.5781

Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	1
Flake scraper	0
Utilized flake	0
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	1
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7179

Cores without cortex	0
Flake Type 1	10
Flake Type 2	24
Flake Type 3	12
Limited-information lithic fragments with cortex	4
Limited-information lithic fragments without cortex	4
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	4
Unknown or other flake type	1
Projectile points	0
Composite tools	1

Table B.67

J-SCORES FOR LA 49385

Ceramics J=0.1507	
Decorated bowls	1
Decorated jars	1
Undecorated bowls	0
Undecorated jars	44

Ground Stone Tools J=0.2632	
Manos	2
Grinding slabs	0
Basin metate	0
Trough metate	0
Pestle	0
Pounding implements	0
Axe	0
Indeterminate ground stone	28
Ground stone other	4

Chipped Stone Tools J=0.4541	
Stage biface	0
End scraper	0
Side scraper	0
End-side scraper	1
Flake scraper	0
Utilized flake	6
Other morphofunctional category	2
Biface form indeterminate	0
Scraper form indeterminate	0
Flake with grinding or pecking on dorsal face	0
Projectile points	1

Chipped Stone Artifacts J=0.7286	
Cores without cortex	4
Flake Type 1	3
Flake Type 2	26
Flake Type 3	4
Limited-information lithic fragments with cortex	2
Limited-information lithic fragments without cortex	7
Limited-attribute flake fragment with cortex	0
Limited-attribute flake fragment without cortex	14
Unknown or other flake type	0
Projectile points	1
Composite tools	3

Table B.68

J-SCORES FOR LA 49386

Ceramics J=0.4591	
Decorated bowls	0
Decorated jars	4
Undecorated bowls	0
Undecorated jars	2

Ground Stone Tools J=0.5252	
Manos	1
Grinding slabs	0
Basin metate	1
Trough metate	3
Pestle	0
Pounding implements	4
Axe	0
Indeterminate ground stone	31
Ground stone other	11

Chipped Stone Tools J=0.5556	
Stage biface	0
End scraper	1
Side scraper	1
End-side scraper	0
Flake scraper	0
Utilized flake	1
Other morphofunctional category	0
Biface form indeterminate	0
Scraper form indeterminate	2
Flake with grinding or pecking on dorsal face	0
Projectile points	0

Chipped Stone Artifacts J=0.7785	
Cores without cortex	1
Flake Type 1	14
Flake Type 2	24
Flake Type 3	5
Limited-information lithic fragments with cortex	9
Limited-information lithic fragments without cortex	12
Limited-attribute flake fragment with cortex	1
Limited-attribute flake fragment without cortex	2
Unknown or other flake type	2
Projectile points	0
Composite tools	3

APPENDIX C

ISOLATED MANIFESTATIONS

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PAGE

Table C.1

MATERIAL BY IH

	01	04	09	11	14	17	18	21	22	29	35	36	37	45	55	56	63	72	75	7900	7901	81	108	n =
17S/OW IH-1							16.7								83.3									6
17S/OW IH-2						66.7													33.1					3
20S/OW IH-1						50.0															50.0			2
21S/OW IH-1		6.3		6.3	6.3	18.8	5.0				12.5	25.0			12.5						12.5			16
22S/OW IH-1						70.0									10.0					5.0	10.0			20
24S/OW IH-1						42.9	28.6				14.3											14.3		7
24S/OW IH-2		11.1				27.8						5.6	5.6		11.1	5.6			5.6	5.6	22.2			18
26S/OW IH-1			38.1			19.0														4.8	38.1			21
26S/OW IH-2																33.3			66.7					3
26S/OW IH-3						64.7	5.9												5.9	5.9	17.6			17
27S/OW IH-1						100.0																		1
31S/OW IH-1						33.3	13.3					6.7				26.7			6.7		13.3			15
33S/OW IH-1						14.3	7.1			21.4					35.7	14.3					7.1			14
34S/OW IH-1		50.0																		50.0				2
34S/OW IH-2		5.0				30.0	5.0	5.0			5.0								5.0		45.0			20
35S/OW IH-1											20.0								20.0		60.0			5
37S/OW IH-1						33.3														33.3	33.3			3
37S/OW IH-2					2.9	58.8	20.6					2.9								5.9	8.8			34
37S/OW IH-3						20.0	40.0												20.0	20.0				5
37S/OW IH-4						100.0																		3
39S/OW IH-1																				100.0				1
40S/OW IH-1			1.9			74.0	8.7								3.8	1.0			1.0	3.8	5.8			104
42S/OW IH-1						36.4	9.1		9.1							9.1					36.4			11
42S/OW IH-2						54.5									9.1				9.1		27.3			11
44S/OW IH-1						28.3	4.3					2.2			10.9	13.0			2.2	13.0	23.9	2.2		46
44S/OW IH-2		3.9				35.5	2.6	9.2				1.3			13.2				5.3	14.5	14.5			76
45S/OW IH-2		7.0			1.8	24.6	8.8		1.8			3.5			17.5	5.3			5.3	17.5	7.0			57
47S/OW IH-1			21.1		5.3	15.8									10.5						47.4			19
48S/OW IH-1			2.8			36.1	19.4									8.3			5.6	8.3	19.4			36
48S/OW IH-3	6.1					36.4						3.0			12.1					3.0	39.4			33
49S/OW IH-1	37.8				2.2	11.1	2.2								26.7	6.7				2.2	11.1			45

Table C.1, continued

MATERIAL BY IM

	01	04	09	11	14	17	18	21	22	29	35	36	37	45	55	56	63	72	75	7900	7901	81	108	n =
50S/OW IM-1						77.8									11.1					11.1				9
50S/OW IM-2						33.3	16.7		5.6						27.8	5.6					11.1			18
54S/OW IM-1						44.4	5.6								5.6	15.6			4.4	4.4	20.0			90
55S/OW IM-1							33.3													33.3	33.3			3
55S/OW IM-2						44.4										22.2			11.1		22.2			9
56S/OW IM-1						20.0	40.0													20.0	20.0			5
56S/OW IM-2						14.3						10.7		3.6	7.1			3.6	17.9	10.7	32.1			28
30S/8W IM-1	22.2				11.1	11.1					44.4	11.1												9
37S/8W IM-1						72.2	11.1								5.6				5.6	5.6				18
37S/8W IM-2						91.2													2.9		5.9			34
54S/8W IM-1						37.5			12.5			12.5			25.0					12.5				8
55S/8W IM-1	10.0	5.0				5.0	10.0				10.0	10.0	5.0		5.0				5.0	20.0	15.0			20
55S/8W IM-2							12.5					50.0			12.5					12.5	12.5			8
0S/16W IM-1						56.7	6.7		1.7	3.3	1.7				6.7					5.0	18.3			60
7S/16W IM-1						54.5					9.1								9.1		27.3			11
10S/16W IM-1						52.0					4.0					4.0				4.0	36.0			25
32S/16W IM-1											66.7										33.3			3
34S/16W IM-1	16.7					66.7										8.3					8.3			12
0S/23W IM-1						28.6				28.6											42.9			7
0S/23W IM-2						35.2	42.6								1.9	1.9		1.9		1.9	14.8			54
5S/23W IM-1					33.3						33.3	33.3												3
10S/23W IM-2			9.1			27.3					18.2	9.1			9.1		9.1		9.1		9.1			11
12S/23W IM-1		5.0				32.5	17.5		2.5	2.5		7.5			5.0				2.5		25.0			40
15S/23W IM-1	25.0						50.0					25.0												4
31S/23W IM-1						12.5	12.5												12.5		62.5			8
32S/23W IM-1							50.0				50.0													2
32S/23W IM-2	33.3					33.3					33.3													3
3S/31W IM-1					7.1	50.0						21.4			7.1				7.1		7.1			14
5S/31W IM-1	3.6		3.6			32.1		10.7			3.6						3.6		17.9	10.7	14.3			28
7S/31W IM-1	6.3				12.5	18.8	6.3				12.5				18.8				12.5	6.3	6.3			16
9S/31W IM-1		4.3				19.1	6.4					8.5			2.1				2.1	19.1	38.3			47

Table C.1, continued

MATERIAL BY IM

	01	04	09	11	14	17	18	21	22	29	33	36	37	45	55	56	63	72	75	7900	7901	81	108	n =
10S/31W IM-1	6.7					20.0									13.3				13.3	13.3	33.3			15
10S/31W IM-2						16.7	10.0								10.0	10.0			3.3		50.0			30
14S/31W IM-1							57.1								14.3	28.6								7
34S/31W IM-1																			50.0		50.0			2
40S/31W IM-1					9.1	18.2					9.1	9.1			18.2					18.2	18.2			11
40S/31W IM-2						27.3										9.1	9.1		9.1		45.5			11
40S/31W IM-3	25.0											25.0			25.0						25.0			4
41S/31W IM-1					11.1	22.2	22.2									11.1					33.3			9
41S/31W IM-2						20.0						40.0									40.0			5
42S/31W IM-1						16.7	16.7						33.3		33.3									6
25S/32W IM-1												50.0							50.0					2
17S/46W IM-1							100.0																	3
18S/46W IM-1		20.0				40.0					20.0				20.0									5
19S/46W IM-1						100.0																		2
25S/46W IM-1	10.0					20.0	10.0					10.0				10.0				10.0	30.0			10
25S 46W IM-2						40.0						20.0							20.0	20.0				5
26S/46W IM-1					7.7	23.1					15.4	7.7	7.7		15.4				7.7	7.7	7.7			13
27S/46W IM-1						71.4															28.6			7
24S/47W IM-1						43.0	4.0								8.0	2.0			6.0	4.0	33.0			100
28S/47W IM-1						50.0	25.0					12.5									12.5			8
43S/47W IM-1						50.0										50.0								2

Table C.2

IMPLEMENT CATEGORY BY ISOLATED MANIFESTATIONS

	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n =
17S/OW IN-1										16.7					16.7	16.7	16.7	16.7			16.7				6
17S/OW IN-2															66.7	33.3									3
20S/OW IN-1															100.0										2
21S/OW IN-1	6.3	6.3		12.5								31.3			6.3	25.0	6.3					6.3			16
22S/OW IN-1	5.0											5.0	5.0	5.0	10.0	45.0	20.0			5.0					20
24S/OW IN-1												14.3			28.6	42.9			14.3						7
24S/OW IN-2		5.6		5.6						5.6			11.1		16.7	33.3	11.1				5.6	5.6			18
26S/OW IN-1													4.8		9.5	23.8	38.1		23.8						21
26S/OW IN-2												33.3				33.3	33.3								3
26S/OW IN-3		5.9								5.9					5.9	23.5	17.6	5.9	35.3						17
27S/OW IN-1																			100.0						1
31S/OW IN-1												20.0			13.3	46.7	6.7		6.7					6.7	15
33S/OW IN-1				7.1						14.3					7.1	21.4	28.6	21.4							14
34S/OW IN-1															100.0										2
34S/OW IN-2		5.0													25.0	40.0	5.0		5.0		10.0	5.0		5.0	20
35S/OW IN-1		20.0		20.0											40.0		20.0								5
37S/OW IN-1			33.3													33.3		33.3							3
37S/OW IN-2			2.9								2.9				2.9	44.1	11.8	11.8	17.6	5.9					34
37S/OW IN-3															20.0	60.0				20.0					5
37S/OW IN-4																100.0									3
39S/OW IN-1																							100.0		1
40S/OW IN-1					1.0								2.9	1.0	4.8	39.4	9.6	12.5	1.0	5.8	20.2	1.0	1.0		104
42S/OW IN-1			9.1									9.1	18.2			36.4		9.1				9.1		9.1	11
42S/02 IN-2													18.2		9.1	27.3	45.5								11
44S/OW IN-1										4.3		4.3	4.3		10.9	45.7	17.4		2.2	4.3	2.2	2.2		2.2	46
44S/OW IN-2			1.3									1.3			11.8	50.0	21.1	2.6	2.6	2.6	2.6	1.3		2.6	76
45S/OW IN-2	3.5		1.8			1.8						5.3	1.8		33.3	35.1	12.3		1.8			1.8		1.8	57
47S/OW IN-1		10.5										5.3			5.3	42.1	15.8	5.3			15.8				19
48S/OW IN-1	2.8									2.8		8.3	11.1		8.3	38.9	11.1	8.3	8.3						36
48S/OW IN-3	3.0	3.0										3.0	3.0		6.1	51.5	3.0		3.0		21.2	3.0			33

Table C.2, continued

IMPLEMENT CATEGORY BY ISOLATED MANIFESTATIONS

	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n =
49S/0W IM-1	11.1											22.2			6.7	22.2	8.9		4.4		24.4				45
50S/0W IM-1													33.3		33.3	33.3									9
50S 0W IM-2			5.6							5.6				5.6	5.6	66.7		5.6	5.6						18
54S/0W IM-1			1.1				1.1				1.1		4.4		8.9	44.4	13.3	5.6	6.7	5.6	5.6	1.1		1.1	90
55S/0W IM-1															33.3		66.7								3
55S/0W IM-2													11.1		11.1	44.4	11.1	22.2							9
56S/0W IM-1												20.0				20.0		20.0		20.0	20.0				5
56S 0W IM-2												17.9		3.6		28.6	7.1	3.6	7.1		28.6			3.6	28
30S/8W IM-1		33.3										55.6			11.1										9
37S/8W IM-1															22.2		27.8	16.7		11.1	16.7	5.6			18
37S/8W IM-2	2.9														11.8	26.5	11.8	5.9	5.9	11.8	20.6	2.9			34
54S/8W IM-1												25.0		12.5	37.5	12.5			12.5						8
55S/8W IM-1		5.0		5.0			20.0					10.0	10.0	5.0		30.0	10.0				5.0				20
55S/8M IM-2										12.5		62.5				12.5			12.5						8
0S/16W IM-1	3.3									1.7	1.7	6.7	3.3	1.7	21.7	33.3	5.0	6.7		6.7	8.3				60
7S/16W IM-1										9.1		9.1			9.1	18.2				18.2	36.4				11
10S/16W IM-1												4.0			12.0	20.0	44.0		4.0	12.0	4.0				25
32S/16W IM-1												66.7			33.3										3
34S/16W IM-1										16.7		8.3			8.3	16.7	16.7		16.7	16.7					12
0S/23W IM-1															42.9	28.6		14.3		14.3					7
0S/23M IM-2															13.0	24.1	27.8	3.7	3.7	7.4	18.5			1.9	54
05S/23W IM-1			66.7									33.3													3
10S/23W IM-1								9.1				27.3				36.4		9.1			9.1	9.1			11
12S/23W IM-1												10.0	2.5		10.0	40.0	12.5	10.0	5.0			7.5	2.5		40
15S/23W IM-1							25.0					50.0												25.0	4
31S/23W IM-1												12.5			12.5	12.5	12.5		37.5		12.5				8
32S/23W IM-1							50.0						50.0												2
32S/23W IM-2	66.7															33.3									3
3S/31W IM-1										7.1		28.6			14.3	35.7			7.1	7.1					14
5S/31W IM-1															14.3	21.4	46.4	3.6			7.1	3.6	3.6		28

Table C.2, continued

IMPLEMENT CATEGORY BY ISOLATED MANIFESTATIONS

	0003	0007	0010	0014	0018	0025	0026	0027	0030	0032	0034	0038	0081	0082	0112	0113	0114	0124	0125	0127	0128	0129	0200	1000	n =
7S/31W IM-1	6.3											25.0			18.8	6.3	18.8	6.3	6.3		6.3			6.3	16
9S/31W IM-1								6.4				4.3	2.1	2.1	4.3	66.0	6.4	4.3	2.1	2.1					47
10S/31W IM-1															20.0	46.7	6.7				13.3	13.3			15
10S/31W IM-2		3.3											6.7		6.7	40.0	13.3	10.0	10.0		6.7			3.3	30
14S/31W IM-1										14.3					14.3	42.9		14.3							7
34S/31W IM-1																50.0		50.0							2
40S/31W IM-1						9.1					9.1	9.1				63.6		9.1							11
40S/31W IM-2												18.2			27.3	27.3				9.1		18.2			11
40S/31W IM-3				25.0											25.0	25.0	25.0								4
41S/31W IM-1												11.1			22.2	44.4	11.1		11.1						9
41S/31W IM-2										20.0		40.0			20.0							20.0			5
42S/31W IM-1								16.7				16.7			50.0	16.7									6
25S/32W IM-1												50.0				50.0									2
17S/46W IM-1															66.7				33.3						3
18S/46W IM-1	20.0											40.0				20.0							20.0		5
19S/46W IM-1										50.0						50.0									2
25S/46W IM-1																40.0	30.0		10.0		10.0	10.0			10
25S/46W IM-2												20.0			40.0	20.0	20.0								5
26S/46W IM-1	7.7											30.8	7.7		15.4	23.1		7.7				7.7			13
27S/46W IM-1										14.3					14.3	14.3	28.6	14.3			14.3				7
24S/47W IM-1												2.0	3.0	2.0	9.0	27.0	18.0	12.0	17.0	2.0	6.0	2.0			100
28S/47W IM-1												12.5			12.5	37.5	25.0		12.5						8
43S/47W IM-1														50.0										50.0	2

400

APPENDIX D

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

SANTA TERESA PROJECT BOWL-JAR COUNTS

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PAGE

Table D.1

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type	Transect/Unit	16S OW IM-1	16S OW IM-2	17S OW IM-1	18S OW IA	20S OW LA49317	20S OW IA	20S OW IM-1	21S OW LA49318	21S OW IA	21S OW IM-1	22S OW IM-1	24S OW IM-2	24S OW IA	26S OW IM-3	27S OW IM-1	29S OW IA	32S OW IA	33S OW IM-1	33S OW IA	34S OW IA	34S OW IM-1	35S OW IA	37S OW LA49321	37S OW IA	37S OW IM-2	38S OW LA49322	43S OW IM-1	43S OW IA	44S OW IM-1	44S OW IM-2	45S OW IM-1	45S OW IM-2	45S OW IA	47S OW IA	48S OW IM-3	49S OW IA	51S OW IA	52S OW LA49323
El Paso Brown									6														1																
Jornada Brown									1																														
Unspecific Brown		1	10		1	65		8	231	3	9	2	6	3	20	6	1		3	2	1	1		18	1	4	1	12	3	6	1	23	24	4	1	8		1	9
El Paso Bichrome Red-on-brown						2					1																												
El Paso Bichrome Black-on-brown				5		16			3	1																							1				1		1
El Paso Polychrome																			1																				
El Paso Corrugated																																							
Three Rivers Red-on-terracotta																																							
Chupadero Black-on-white																					1																		
Mimbres Boldface Black-on-white																																							
Mimbres Classic Black-on-white						1																																	
Mimbres Black-on-white									3																														
Playas Red Incised						1																																	
Playas Red																																							
Red Slipped Brown		3					1																																
Gila Polychrome																																				1			
St. Johns Black-on-red																																							
Unidentified Slipped Corrugated										2																													
Unknown Red Ware																		1																					
Unidentified Black-on-white																																							
Unidentified Chihuahuan Polychrome																																							
Unidentifiable																																							
Unidentified Brown																																							
Polished Brown Slipped																																							
Red Slipped Corrugated																																							
Unidentified Obliterated Corrugated																																							
Unidentified Buff																																							
Stucco																																							
Unidentified Black-on-brown																																							
Total		4	10	5	1	85	1	8	244	6	10	2	6	3	20	6	1	1	4	2	2	1	1	18	1	4	1	12	3	6	1	23	25	4	1	9	1	1	10

Table D.1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type / Transect/Unit	43S 1W LA49369	44S 1W LA49369	16S 2W LA49352	17S 2W LA49352	20S 2W IA	28S 2W IA	38S 2W LA49386	16S 3W IA	20S 3W LA49362	38S 3W IA	36S 4W LA49365	36S 5W LA49364	37S 5W LA49364	21S 6W IA	27S 6W IA	36S 6W LA49377	50W 6W LA49376	51S 6W LA49376	56S 6W IA	17S 7W IA	19S 8W IM-1	20S 7W LA49366	22S 7W IA	50S 7W IA	22S 8W IA	26S 8W IA	28S 8W IA	30S 8W IA	30S 8W IM-1	32S 8W IM-1	33S 8W IM-1	35S 8W LA49381	36S 8W IA	37S 8W IA	37S 8W IM-1	38S 8W IM-1	39S 8W LA49378	43S 8W IA	47S 8W IA
El Paso Brown				1	1			1																1						14*									
Jornada Brown												1						2		2																			
Unspecific Brown	2	1	2	13			2		19	1		3	3					10				9			1	5	5		10		40	20	1		1	6	1	11	6
El Paso Bichrome Red-on-brown			1						1																														
El Paso Bichrome Black-on-brown							4				4	2									18		3									2							
El Paso Polychrome																					2		1																
El Paso Corrugated						1																						1		9									
Three Rivers Red-on-terracotta																																							
Chupadero Black-on-white				1																			1																
Mimbres Boldface Black-on-white																																		1					
Mimbres Classic Black-on-white																																							
Mimbres Black-on-white																			1																				
Playas Red Incised																	8																						
Playas Red																																							
Red Slipped Brown												1							1																				
Gila Polychrome																																							
St. Johns Black-on-red																							1																
Unidentified Slipped Corrugated																																							
Unknown Red Ware																																							
Unidentified Black-on-white														1																									
Unidentified Chihuahuan Polychrome															1	1																							
Unidentifiable																			1										5										
Unidentified Brown																																							
Polished Brown Slipped																																							
Red Slipped Corrugated																																							
Unidentified Obliterated Corrugated																																							
Unidentified Buff																																							
Stucco																																							
Unidentified Black-on-brown																																							
Total	2	1	3	15	1	1	6	1	20	1	4	7	3	1	1	1	8	12	3	2	20	9	6	1	1	5	5	1	15	23	40	22	1	1	1	6	1	11	6

* 1 vessel

Table D.1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type	Transect/Unit	48S 8W IA	49S 8W IA	50S 8W IA	52S 8W IA	53S 8W IM-1	54S 8W IA	54S 8W IM-1	55S 8W IM-1	55S 8W IM-2	55S 8W IA	56S 8W IA	38S 9W LA49379	46S 9W IA	47S 9W IA	47S 9W LA49368	35S 10W LA49382	36S 10W LA49382	35S 11W LA49382	36S 11W LA49382	33S 12W LA49384	31S 13W LA49385	32S 13W LA49372	33S 13W LA49372	33S 13W LA49384	39S 13W IA	31S 14W LA49385	32S 14W LA49372	32S 14W LA49374	33S 14W LA49372	3[illegible]S 14W LA49370	41S 15W LA49331	0S 16W IA	1S 16W IA	2S 16W IA	3S 16W IA	5S 16W IA	7S 16W IA	7S 16W IM-1	8S 16W IA
El Paso Brown			1											2	1	3						1										1		1					1	
Jornada Brown						1		3		4							9	5			1			3				2												
Unspecific Brown		3		5	4	1	6	17	10	12	36	9	56			72	8				31	2	62	41	5		40	11	15	6	5	19	1	1	2		1	6		
El Paso Bichrome Red-on-brown																										4														
El Paso Bichrome Black-on-brown			1							2																	1						1	7						2
El Paso Polychrome						1																													5			1		
El Paso Corrugated																			1																			1	14	
Three Rivers Red-on-terracotta																																								
Chupadero Black-on-white											3																													
Mimbres Boldface Black-on-white						3*					1																													
Mimbres Classic Black-on-white																1																								
Mimbres Black-on-white																						1																		
Playas Red Incised																																				2				
Playas Red																																				3				
Red Slipped Brown									1		1					3	1	6										1										1		
Gila Polychrome																																								
St. Johns Black-on-red																																								
Unidentified Slipped Corrugated																																								
Unkmown Red Ware																																								
Unidentified Black-on-white																																								
Unidentified Chihuahuan Polychrome																																								
Unidentifiable							3			1																	1		1											
Unidentified Brown									1																															
Polished Brown Slipped																				1																				
Red Slipped Corrugated																																								
Unidentified Obliterated Corrugated																																								
Unidentified Buff																																								
Stucco																																								
Unidentified Black-on-brown																																								
Total		3	2	5	4	6	9	20	12	19	41	9	56	2	1	79	18	11	1	1	32	4	62	44	5	4	42	14	16	6	5	20	2	9	7	5	1	9	15	2

* 1 vessel

Table D-1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type / Transect/Unit	9S 16W IA	28S 16W IA	32S 16W IM-1	33S 16W IA	34S 16W IA	55S 16W IA	2S 17W IA	9S 17W IA	29S 17W LA49332	29S 17W IA	2S 18W IA	5S 18W LA49334	6S 18W IA	9S 18W IA	38S 18W IA	2S 19W LA49335	6S 10W IA	7S 19W IA	11S 19W LA49337	10S 20W IA	4S 21W IA	7S 21W LA49344	4S 22W IA	5S 22W IA	7S 22W LA49344	7S 22W LA49344	8S 22W IA	9S 22W IA	11S 22W IA	32S 22W IA	35S 22W IA	1S 23W LA49340	2S 23W IA	3S 23W IA	5S 23W IM-1	8S 23W IA	9S 23W LA49340	10S 23W IM-1
El Paso Brown			1																			4															3	
Jornada Brown										1						2																						
Unspecific Brown	1	1	48*	6	3	2			25			10				4			3					1	1	24	1			2					13	2	155	21
El Paso Bichrome Red-on-brown																															1					1	1	
El Paso Bichrome Black-on-brown			3	1				1								4					1					28	1	1		2p							87	3
El Paso Polychrome							1									4								2													29	
El Paso Corrugated																		1							2												3	7
Three Rivers Red-on-terracotta												1																										
Chupadero Black-on-white													3							1		3					1						4				3	
Mimbres Boldface Black-on-white															4																							
Mimbres Classic Black-on-white																																						
Mimbres Black-on-white			1														1														2							
Playas Red Incised											1			1.															1.									
Playas Red											7																											
Red Slipped Brown									1																													1
Gila Polychrome																							1															
St. Johns Black-on-red																																						
Unidentified Slipped Corrugated																																						
Unknown Red Ware																									1													
Unidentified Black-on-white											2																							1				
Unidentified Chihuahuan Polychrome																																						
Unidentifiable																2									3							2						
Unidentified Brown											4																											
Polished Brown Slipped																																						
Red Slipped Corrugated																																					1	
Unidentified Obliterated Corrugated																																						
Unidentified Buff																																						
Stucco																																						
Unidentified Black-on-brown																																						
Total	1	1	53	7	3	2	1	1	26	1	14	11	3	1	4	16	1	1	3	1	1	7	1	3	7	52	3	1	1	4	3	2	4	1	13	3	282	32

* probably same vessel
. tooled
p Puncate

Table D.1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type	Transect/Unit	11S 23W LA49342a	11S 23W LA49342b	11S 23W IA	12S 23W IN-1	12S 23W IC Gen	15S 23W IN-1	26S 23W IA	30S 23W IA	31S 23W IA	32S 23W IN-2	32S 23W IN-1	32S 23W IA	37S 23W IA	30S 23W IA	47S 23W IN-1	47S 23W IA	1S 24W IA	15S 24W LA493302	15S 24W LA493302	44S 24W IA	7S 25W IA	15S 25W LA49356a	15S 25S LA49356b	15S 25W LA49356c	15S 25W LA49356d	15S 25W LA49356e	45S 25W LA49350	11S 26W LA49357	12S 26W LA49357	14S 26W IA	14S 26W LA49351	44S 26W LA49348	1S 27W IA	35S 27W IA	4S 27W LA49353	5S 27W LA49353	10S 27W IA	11S 27W LA49355
El Paso Brown			1													2					1										1		1			1**			
Jornada Brown					3				2			1					2										1												
Unspecific Brown		3	120	5	5	2				2	1	3	1	1	3	16	3		15	8			15	6	5	8	4	50	5	11		2	17			65	2		9
El Paso Bichrome Red-on-brown				1				1																3		2	1									4			
El Paso Bichrome Black-on-brown		1	17	4	4																	1		4					1					5		28			
El Paso Polychrome			4	1	1																				3											3			
El Paso Corrugated		6	7	3							4					2							2					5										1	
Three Rivers Red-on-terracotta																																							
Chupadero Black-on-white			5	1	1	1												5										1								2	3		
Mimbres Boldface Black-on-white																																							
Mimbres Classic Black-on-white																																				1			
Mimbres Black-on-white																					1							1	2										
Playas Red Incised		1	(2)																																				
Playas Red		4	11																																				
Red Slipped Brown			5	1	2																			1		2										3			
Gila Polychrome																																							
St. Johns Black-on-red																																							
Unidentified Slipped Corrugated																																							
Unknown Red Ware																																							
Unidentified Black-on-white																																							
Unidentified Chihuahuan Polychrome																																			1				
Unidentifiable		4					1											1						3		1										8			
Unidentified Brown																																							
Polished Brown Slipped																																							
Red Slipped Corrugated					1																				2														
Unidentified Obliterated Corrugated				6																																			
Unidentified Buff																																					1		
Stucco																																							
Unidentified Black-on-brown																																							
Total		19	172	22	17	3	1	1	2	2	5	4	1	1	3	20	5	6	15	8	2	1	17	17	10	13	6	57	8	11	1	2	18	5	1	117	6	1	9

Table D.1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Transect/Unit Ceramic Type	11S 27W LA49357	12S 27W LA49357	15S 27W LA49359	41S 27W IA	43S 27W IA	3S 28W LA49347	4S 28W IA	7S 28W IA	9S 28W LA49345	10S 28W LA49343	14S 28W LA49358b	16S 28W LA49360	43S 28W LA49346	2S 29W LA49349	18S 29W IA	0S 30W IA	0S 30W LA49336	4S 30W LA49339	3S 30W LA49339	42S 30W IA	0S 31W IA	0S 31W LA49336	4S 31W IA	5S 31W IA	7S 31W IA	10S 31W IA	11S 31W IA	19S 31W IA	33S 31W IA	34S 31W IA	34S 31W IM-1	35S 31W IA	40S 31W IM-1	40S 31W IM-2	40S 31W IM-3	41S 31W IM-1	41S 31W IA	41S 31W IM-2
El Paso Brown	3	3**			1	1				1		1	1					2	1	1							1											2
Jornada Brown			1									1									1							1	2						1			
Unspecific Brown	15	44	44			13			6	11	8	56	81	4			29	78				23	9	1			1		3	1	10		2	6	4	1	1	3
El Paso Bichrome Red-on-brown																																						
El Paso Bichrome Black-on-brown	6		10	1								1	4		3										2							1	1					
El Paso Polychrome			1				1					1	2																									
El Paso Corrugated		3										17																										
Three Rivers Red-on-terracotta																																						
Chupadero Black-on-white						3*										1										1												
Mimbres Boldface Black-on-white																																						
Mimbres Classic Black-on-white																																						
Mimbres Black-on-white								1				1			2																							
Playas Red Incised													4																									
Playas Red													2																									
Red Slipped Brown																							2															
Gila Polychrome																																						
St. Johns Black-on-red																																						
Unidentified Slipped Corrugated																																						
Unknown Red Ware																																						
Unidentified Black-on-white	2																																					
Unidentified Chihuahuan Polychrome																																						
Unidentfiable																																						
Unidentified Brown													5										1															
Polished Brown Slipped																																						
Red Slipped Corrugated																																						
Unidentified Obliterated Corrugated																																						
Unidentified Buff															1																							
Stucco													1																									
Unidentified Black-on-brown																															1							
Total	26	50	56	1	1	17	1	1	6	12	8	78	100	4	6	1	29	80	1	1	1	23	12	1	2	1	2	1	5	1	11	1	3	6	5	1	1	5

* same vessel
** incised

Table D.1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Transect/Unit Ceramic Type	42S 31W IA	42S 31W IM-1	43S 31W LA49329	51S 31W IA	55S 31W IA	25S 32W IM	19S 33W IA	20S 35W IA	17S 36W IA	22S 38W LA49327	23S 38W LA49327	22S 39W LA49327	23S 39W LA49327	52S 39W LA49371	20S 40W LA49328	36S 40W IA	48S 40W LA49367	46S 41W LA49326	27S 43W IA	29S 44W IA	29S 45W IA	17S 46W IA	19S 46W IM-1	20S 46W IA	25S 46W IA	25S 46W IM-2	26S 46W LA49325	26S 46W IM-1	27S 46W IA	27S 46W IM-1	27S 46W LA49325	39S 46W IM-1	17S 47W IA	18S 47W IA	19S 47W IA	21S 47W LA49324	26S 47W IM-1
El Paso Brown		1																1	1		1							3	1					10			
Jornada Brown			11					1									1	3			1																
Unspecific Brown	16	15	30	1	1	2				15	21	7	6	3	4		14	33				13		1	3	2	10	2	6	13	5	1			6	4	2
El Paso Bichrome Red-on-brown		1														1																					
El Paso Bichrome Black-on-brown			3								1																1		1								
El Paso Polychrome						1																															
El Paso Corrugated		8*																										7									1
Three Rivers Red-on-terracotta																																					
Chupadero Black-on-white																																					
Mimbres Boldface Black-on-white																																					
Mimbres Classic Black-on-white																																					
Mimbres Black-on-white		1					2																2														
Playas Red Incised																																					
Playas Red																																					
Red Slipped Brown											2																			1			9				
Gila Polychrome																																					
St. Johns Black-on-red																																					
Unidentified Slipped Corrugated																																					
Unknown Red Ware			1																	1																	
Unidentified Black-on-white																																					
Unidentified Chihuahuan Polychrome									1																												
Unidentifiable																			1				19														
Unidentified Brown																																					
Polished Brown Slipped																																					
Red Slipped Corrugated																																					
Unidentified Obliterated Corrugated																																					
Unidentified Buff																																					
Stucco																																					
Unidentified Black-on-brown																																					
Total	16	26	45	1	1	3	2	1	1	15	24	7	6	3	4	1	15	37	2	1	2	13	21	1	3	2	11	12	8	14	5	1	9	10	6	4	3

* 1 vessel

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PAGE

Table D-1, continued

SPATIAL DISTRIBUTION AND FREQUENCY OF SANTA TERESA CERAMICS

Ceramic Type	26S 74W IA	27S 47W IA	28S 47W IM-1	28S 47W IA	29S 47W IA	29S 47W IM-1	30 S 47W IA	40S 47W IA	43S 47W IM-1	43S 47W IM-1	50S 47W IM-1	Total	Percentage
El Paso Brown									1	1	18	107	0.03
Jornada Brown			1		1	4						76	0.02
Unspecific Brown	2	2	1	4	3	5	1	11	34	35		2,642	0.73
El Paso Bichrome Red-on-brown												26	0.01
El Paso Bichrome Black-on-brown												307	0.08
El Paso Polychrome												65	0.02
El Paso Corrugated												106	0.03
Three Rivers Red-on-terracotta												1	0.0003
Chupadero Black-on-white												45	0.01
Mimbres Boldface Black-on-white												9	0.002
Mimbres Classic Black-on-white												3	0.0008
Mimbres Black-on-white												22	0.01
Playas Red Incised												21	0.01
Playas Red												33	0.01
Red Slipped Brown												53	0.01
Gila Polychrome												1	0.0003
St. Johns Black-on-red												1	0.0003
Unidentified Slipped Corrugated												2	0.0006
Unknown Red Ware												4	0.001
Unidentified Black-on-white												6	0.002
Unidentified Chihuahuan Polychrome												2	0.0006
Unidentifiable												57	0.02
Unidentified Brown												11	0.003
Polished Brown Slipped												1	0.0003
Red Slipped Corrugated												4	0.001
Unidentified Obliterated Corrugated												6	0.002
Unidentified Buff												2	0.0006
Stucco												1	0.0003
Unidentified Black-on-brown												1	0.0003
Total	2	2	2	4	4	9	1	11	35	36	18	3,615	

Table D.2

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49317				
Unspecific brown		65		
El Paso Bichrome Red-on-brown		2		
El Paso Bichrome Black-on-brown		7	2	7
Mimbres Classic Black-on-white			1	
Playas Red Incised		1		
LA 49318				
El Paso Brown			1	5
Jornada Brown		1		
Unspecific brown		231		
El Paso Bichrome Black-on-brown		1	2	
Unknown Mimbres Black-on-white	3			
LA 49321				
Unspecific brown		18		
LA 49323				
Unspecific brown		9		
El Paso Bichrome Black-on-brown		1		
LA 49325				
Unspecific brown		15		
El Paso Bichrome Black-on-brown		1		
LA 49326				
El Paso Brown				1
Jornada Brown		3		
Unspecific brown		33		
LA 49327				
Unspecific brown (1 worked)	2	47		
El Paso Bichrome Black-on-brown		1		
Red-slipped brown		1		1
LA 49328				
Unspecific brown (4)		4		
LA 49329				
Jornada Brown		11		
Unspecific brown		30		
El Paso Bichrome Black-on-brown	1	2		
Unidentified red (worked sherd)		1		

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49330				
Unspecific brown	1	22		
LA 49331				
El Paso Brown				1
Unspecific brown		19		
LA 49332				
Unspecific brown		25		
Red-slipped brown		1		
LA 49333				
Unspecific brown		10		
Three Rivers Red-on-terracotta	1			
LA 49335				
Jornada Brown		2		
Unspecific brown		4		
El Paso Bichrome Black-on-brown	1	3		
El Paso Polychrome		4		
Unidentifiable	2			
LA 49336				
Unspecific brown		50		2
LA 49337				
Unspecific brown		3		
LA 49339				
El Paso Brown			3	
Unspecific brown		78	9	
LA 49340				
Unidentifiable--eroded		2		
LA 49341				
El Paso Brown		3		
Unspecific brown		155		
El Paso Bichrome Red-on-brown				1
El Paso Bichrome Black-on-brown	15	42	9	21
El Paso Polychrome	3	21		5
El Paso Corrugated		3		
Chupadero Black-on-white		3		
Red-slipped Corrugated		1		

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

	Body		Rim	
Site	Bowl	Jar	Bowl	Jar
LA 49342 (Locus A)				
Unspecific brown		3		
El Paso Bichrome Black-on-brown		1		
El Paso Corrugated		6		
Playas Red	2	2		
Playas Red Tooled		1		
Unidentified		4		
LA 49342 (Locus B)				
El Paso Brown				1
Unspecific brown		120		
El Paso Bichrome Black-on-brown	12	5		
El Paso Polychrome			4	
El Paso Corrugated		7		
Chupadero Black-on-white	1	4		
Playas Red	7	2	2	
Playas Red Incised	2			
Playas Red Tooled		7		
Red-slipped brown		4		1
LA 49343				
El Paso Brown			1	
Unspecific brown		11		
LA 49344				
El Paso Brown		3		1
Chupadero Black-on-white		3		
LA 49344 (Locus A)				
Unspecific brown		1		
El Paso Corrugated		2		
Unidentified red ware		1		
Unidentified	3			
LA 49344 (Locus B)				
Unspecific brown		24		
El Paso Bichrome Black-on-brown		23		5
LA 49345				
Unspecific brown		6		
LA 49346				
El Paso Brown				1
Unspecific brown		81		

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49346, continued				
El Paso Bichrome Black-on-brown		4		
El Paso Polychrome		2		
Playas Red Incised		4		
Playas Red		2		
Stucco		1		
Unidentified-slipped brown ware		5		
LA 49347				
El Paso Brown				1
Unspecific Brown		13		
Chupadero Black-on-white (1 vessel)		3		
LA 49348				
El Paso Brown				1
Unspecific brown		17		
LA 49349				
Unspecific brown		4		
LA 49350				
Unspecific brown		50		
El Paso Corrugated		4		1
Chupadero Black-on-white		1		
Mimbres Black-on-white, unidentified		1		
LA 49351				
Unspecific brown (badly eroded)	1			1
LA 49352				
El Paso Brown			1	
Unspecific brown		15		
El Paso Bichrome Red-on-brown			1	
Chupadero Black-on-white		1		
LA 49353				
El Paso Brown Incised		1		
Unspecific brown		67		
El Paso Bichrome Red-no-brown		4		
El Paso Bichrome Black-on-brown	4	23		1
El Paso Polychrome	1	2		
Chupadero Black-on-white (1 worked)		5		
Mimbres Classic Black-on-white			1	

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49353, continued				
Red-slipped brown		5		
Unidentified (1 worked)	1	7		
Unidentified buff		1		
LA 49355				
Unspecific brown		9		
LA 49356				
Jornada Brown		1		
Unspecific brown	1	37		
El Paso Bichrome Red-on-brown	3	3		
El Paso Bichrome Black-on-brown		4		
El Paso Polychrome		3		
El Paso Corrugated		2		
Mogollon Red-on-brown	3			
Red-slipped brown		5		
Unidentified		1		
LA 49357				
El Paso Brown				3
Unspecific brown		59		
El Paso Bichrome Black-on-brown		6		
El Paso Corrugated		3		
Unidentified Mimbres	2			
Unidentified Black-on-white	1		1	
El Paso Brown Incised		3		
LA 49358 (Locus B)				
Unspecific brown		8		
LA 49359				
Jornada Brown	1			
Unspecific Brown		44		
El Paso Bichrome Black-on-brown		10		
El Paso Polychrome		1		
LA 49360				
El Paso Brown				1
Jornada Brown		1		
Unspecific brown		56		
El Paso Bichrome Black-on-brown		1		
El Paso Polychrome		1		
El Paso Corrugated	13	4		
Unknown Mimbres Black-on-white	1			

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49361				
Unspecific brown		1		
LA 49362				
Unspecific brown		19		
El Paso Bichrome Red-on-brown			1	
LA 49364				
Jornada Brown	1			
Black-on-brown	2			
Red-slipped brown		1		
Unspecific brown		6		
LA 49365				
Black-on-brown		1		3
LA 49366				
Unspecific brown		9		
LA 49367				
Jornada Brown		1		
Unspecific brown		14		
LA 49368				
El Paso Brown		1		2
Unspecific brown		72		
Mimbres Classic Black-on-white			1	
Red-slipped brown		3		
LA 49369				
Unspecific brown		3		
LA 49370				
Unspecific brown		5		
LA 49371				
Unspecific brown		3		
LA 49372				
Jornada Brown		5		
Unspecific brown		114		
Red-slipped brown				1

Table D.2, continued

SANTA TERESA PROJECT BOWL-JAR COUNTS

Site	Body		Rim	
	Bowl	Jar	Bowl	Jar
LA 49374				
Unspecific brown		15		
Unidentified buff paste (worked)			1	
LA 49377				
Unspecific brown		1		
LA 49378				
Unspecific brown		1		
LA 49379				
Unspecific brown		56		
LA 49381				
Unspecific brown		20		
El Paso Bichrome Black-on-brown		2		
LA 49382				
Jornada Brown		14		
Unspecific brown		8		
Red-slipped brown		7		
Polished brown-slipped		1		
LA 49384				
Jornada Brown		1		
Unspecific brown		36		
LA 49385				
El Paso Brown				1
Unspecific brown		42		
Black-on-brown		1		
Unknown Mimbres Black-on-white (worked)	1			
Unidentified gray-brown plain ware		1		
LA 49386				
Unspecific brown		2		
El Paso Bichrome Black-on-brown		4		

APPENDIX E

ARTIFACT FREQUENCY DATA USED TO CONSTRUCT ARTIFACT DISTRIBUTION SYMAPS FOR THE SANTA TERESA STUDY AREA

Table E.1

Artifact frequency data used to construct artifact distribution Symaps for the Santa Teresa Study Area.

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
00/16	28	3	1	10	14	1a
00/17	18	1	0	12	5	1a
00/18	2	0	0	1	1	1a
00/19	3	1	0	2	0	1a
00/20	174	14	7	59	94	1a
00/21	341	15	19	47	260	1a
00/22	23	1	1	19	2	1a
00/23	2	0	0	2	0	1a
00/24	49	2	3	35	9	1a
00/25	13	0	1	0	12	1a
00/26	60	0	1	20	39	1a
00/27	40	16	4	14	6	1a
00/28	3	0	0	3	0	1a
00/29	2	0	0	1	1	1a
00/30	23	12	0	11	0	1a
00/31	17	2	3	12	0	1a
00/32	3	0	1	1	1	1a
00/33	27	1	2	18	6	1a
00/34	45	9	0	33	3	1a
00/35	11	0	2	8	1	1a
00/36	4	3	0	1	0	1a
00/37	177	10	9	135	23	1a
00/38	165	1	5	158	1	1a
00/39	37	6	3	28	0	1a
00/40	120	4	9	107	0	1a
00/41	34	6	2	26	0	1a
00/42	2	0	2	0	0	1a
00/43	37	1	2	19	15	1a
00/44	119	0	4	108	7	1a
00/45	145	2	7	84	52	1a
00/46	8	0	0	8	0	1a
00/47	31	0	1	29	1	1a
00/48	109	6	9	85	9	1a
00/49	73	11	11	50	1	1a
00/50	36	1	3	32	0	1a
00/51	120	6	8	86	20	1a
00/52	173	17	6	129	21	1a
00/53	11	0	3	8	0	1a
00/54	97	1	2	94	0	1a
00/55	37	3	0	34	0	1a
00/56	38	1	7	30	0	1a
00/57	3	0	2	1	0	1a
01/16	0	0	0	0	0	1b
01/17	0	0	0	0	0	1b
01/18	3	0	0	3	0	1b
01/19	3	0	0	3	0	1a
01/20	8	4	1	3	0	1b
01/21	9	3	2	4	0	1a

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
01/22	11	0	1	9	1	1a
01/23	25	8	2	15	0	1a
01/24	8	1	0	7	0	1a
01/25	14	5	0	9	0	1a
01/26	27	5	1	21	0	1a
01/27	6	4	1	1	0	1a
01/28	18	2	0	13	3	1a
01/29	20	4	3	13	0	1a
01/30	15	1	0	13	1	1a
01/31	32	6	1	24	1	1a
01/32	9	4	3	2	0	1a
01/33	7	1	0	5	1	1a
01/34	9	1	1	7	0	1a
01/35	16	6	1	7	2	1a
01/36	7	1	3	3	0	1a
01/37	18	1	4	13	0	1a
01/38	18	4	5	9	0	1a
01/39	59	2	8	10	39	1a
01/40	20	8	3	9	0	1a
01/41	27	5	6	16	0	1a
01/42	16	0	2	14	0	1a
01/43	44	13	13	16	2	1a
01/44	110	22	21	66	1	1a
01/45	12	1	2	9	0	1a
01/46	10	0	1	6	3	1a/1b
01/47	4	0	0	3	1	1a/1b
01/48	10	1	1	8	0	1a
01/49	19	12	3	4	0	1a
01/50	10	1	1	7	1	1a
01/51	9	0	2	7	0	1a
01/52	12	1	0	11	0	1a
01/53	9	1	0	8	0	1a
01/54	10	0	0	10	0	1a
01/55	8	0	4	4	0	1a
01/56	5	1	1	3	0	1a
01/57	0	0	0	0	0	1a
02/16	96	21	8	64	3	1b
02/17	155	43	10	87	15	1b
02/18	13	3	1	6	3	1a
02/19	1	0	1	0	0	1a
02/20	12	0	4	6	2	1a
02/21	19	3	2	7	7	1b
02/22	2	0	0	0	2	1b
02/23	2	0	0	2	0	1b
02/24	34	3	3	13	15	1b
02/25	38	19	3	15	1	1b
02/26	11	2	2	7	0	1a
02/27	3	0	2	1	0	1a
02/28	78	10	11	57	0	1a
02/29	82	8	4	70	0	1a

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
02/30	6	0	0	6	0	1a
02/31	24	0	4	20	0	1a
02/32	9	0	2	7	0	1a
02/33	94	4	11	78	1	1a
02/34	27	4	7	16	0	1a
02/35	15	1	4	10	0	1a
02/36	11	7	1	3	0	1a
02/37	18	2	4	12	0	1a
02/38	350	10	36	298	6	1a
02/39	97	9	15	73	0	1a
02/40	38	3	9	25	1	1a
02/41	34	7	4	23	0	1a
02/42	12	0	0	12	0	1a
02/43	9	4	0	5	0	1a
02/44	57	18	5	34	0	1a
02/45	4	0	0	4	0	1b
02/46	5	0	1	4	0	1b
02/47	8	0	2	6	0	1b
02/48	11	1	3	2	5	1a
02/49	34	4	10	20	0	1a
02/50	27	7	3	17	0	1a
02/51	11	1	3	7	0	1a
02/52	1	0	0	1	0	1a
02/53	9	0	0	9	0	1b
02/54	6	0	0	6	0	1b
02/55	9	0	1	6	2	1b
02/56	9	0	4	5	0	1b
02/57	4	0	3	1	0	1b
03/16	19	3	3	13	0	1b
03/17	20	2	6	10	2	1a
03/18	8	0	0	8	0	1a
03/19	1	0	1	0	0	1b
03/20	88	8	14	46	20	1b
03/21	2	0	0	1	1	1b
03/22	2	0	1	1	0	1b
03/23	7	3	2	2	0	1b
03/24	7	2	0	5	0	1a
03/25	14	3	2	9	0	1a
03/26	11	1	2	4	4	1a
03/27	68	9	1	13	45	1a
03/28	19	2	4	13	0	1a
03/29	14	0	4	10	0	1a
03/30	7	1	3	3	0	1a
03/31	12	0	2	10	0	1a
03/32	10	0	1	8	1	1a
03/33	4	0	2	2	0	1a
03/34	19	2	0	17	0	1a
03/35	13	1	3	9	0	1a
03/36	2	0	0	1	1	1a
03/37	82	10	12	60	0	1a
03/38	386	8	47	331	0	1a
03/39	57	11	5	31	10	1a

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
03/40	31	1	9	21	0	1a
03/41	6	1	1	4	0	1a
03/42	4	2	1	1	0	1b
03/43	13	0	2	11	0	1b
03/44	6	0	3	1	2	1b
03/45	2	1	0	1	0	1b
03/46	9	0	0	0	9	1b
03/47	6	1	2	3	0	1b
03/48	6	0	0	2	4	1b
03/49	7	0	4	3	0	1b
03/50	9	2	4	2	1	1a
03/51	6	1	1	3	1	1a
03/52	0	0	0	0	0	1a
03/53	0	0	0	0	0	1b
03/54	17	1	2	13	1	1b
03/55	7	1	1	4	1	1b
03/56	2	0	0	2	0	1b
03/57	0	0	0	0	0	1b
04/16	3	1	1	1	0	1b
04/17	2	1	0	1	0	1a
04/18	1	0	0	1	0	1a
04/19	1	1	0	0	0	1a
04/20	2	0	1	1	0	1b
04/21	12	0	0	6	6	1b
04/22	14	0	2	12	0	1b
04/23	14	1	0	13	0	1b
04/24	16	0	5	3	8	1a
04/25	0	0	0	0	0	1a
04/26	18	0	1	17	0	1a
04/27	12	0	3	5	4	1a
04/28	8	1	0	7	0	1a
04/29	10	3	5	2	0	1a
04/30	27	15	1	11	0	1a
04/31	0	0	0	0	0	1a
04/32	8	3	2	3	0	1a
04/33	3	1	0	2	0	1a
04/34	5	1	0	4	0	1a
04/35	11	4	1	6	0	1a
04/36	106	56	8	42	0	1a
04/37	225	6	45	169	5	1a
04/38	44	3	10	31	0	1a
04/39	11	1	1	9	0	1a
04/40	23	12	1	10	0	1a
04/41	1	1	0	0	0	1b
04/42	25	14	6	5	0	1b
04/43	10	6	0	4	0	1b
04/44	3	0	1	2	0	1b
04/45	4	2	0	2	0	1b
04/46	6	2	0	4	0	1b
04/47	5	1	1	3	0	1b
04/48	35	5	8	15	7	1b
04/49	11	0	3	6	2	1b

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
04/50	27	3	5	19	0	1a
04/51	4	1	0	3	0	1a
04/52	50	1	3	8	38	1a
04/53	2	0	0	2	0	1b
04/54	9	1	1	7	0	1b
04/55	9	1	1	7	0	1b
04/56	4	0	0	4	0	1b
04/57	13	0	2	11	0	1b
05/16	7	0	2	5	0	1b
05/17	1	0	1	0	0	1b
05/18	17	1	2	14	0	1a
05/19	16	2	4	10	0	1a
05/20	5	0	2	3	0	1b
05/21	3	0	1	2	0	1b
05/22	12	0	1	10	1	3a
05/23	0	0	0	0	0	3b
05/24	13	0	2	0	11	3b
05/25	24	2	0	5	17	1a
05/26	17	2	0	9	6	1a
05/27	6	0	1	5	0	1a
05/28	5	2	0	3	0	1a
05/29	19	1	1	8	9	1a
05/30	163	3	9	151	0	1a
05/31	7	5	0	2	0	1a
05/32	1	0	1	0	0	1a
05/33	7	0	2	5	0	1a
05/34	7	2	0	5	0	1a
05/35	13	1	3	9	0	1a
05/36	565	7	113	441	4	1a
05/37	579	7	116	452	4	1a
05/38	9	1	0	8	0	1a
05/39	5	1	0	4	0	1a
05/40	5	0	0	5	0	1a
05/41	0	0	0	0	0	1b
05/42	9	2	2	5	0	1b
05/43	1	0	0	1	0	1b
05/44	1	0	0	1	0	1b
05/45	3	0	0	1	2	1b
05/46	1	0	0	1	0	1b
05/47	4	1	0	3	0	1b
05/48	8	0	2	6	0	1b
05/49	7	1	0	6	0	1b
05/50	17	0	5	10	2	1b
05/51	9	2	0	6	1	1b
05/52	12	6	2	4	0	1a
05/53	6	1	0	5	0	1a
05/54	8	1	1	6	0	1b
05/55	52	2	9	16	25	1b
05/56	7	1	1	3	2	1b
05/57	1	0	0	1	0	1b
06/16	3	0	0	0	3	3a
06/17	0	0	0	0	0	3a

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
06/18	1	0	0	1	0	1b
06/19	3	1	0	2	0	1b
06/20	9	2	1	4	2	3b
06/21	8	0	0	7	1	3b
06/22	3	0	0	0	3	3b
06/23	0	0	0	0	0	3b
06/24	0	0	0	0	0	3b
06/25	4	0	1	3	0	3b
06/26	1	0	0	1	0	1a
06/27	2	0	0	1	1	1a
06/28	2	0	0	2	0	1a
06/29	1	0	0	1	0	1a
06/30	2	0	0	2	0	1a
06/31	5	0	0	5	0	1a
06/32	3	0	0	3	0	1a
06/33	4	0	0	4	0	1a
06/34	6	1	3	2	0	1a
06/35	55	4	15	36	0	1a
06/36	111	11	20	79	1	1a
06/37	2	0	0	2	0	1a
06/38	9	4	3	2	0	1a
06/39	2	0	1	1	0	1a
06/40	3	0	0	3	0	1a
06/41	6	0	1	4	1	1a
06/42	4	0	0	4	0	1b
06/43	7	1	2	4	0	1b
06/44	5	0	1	4	0	1b
06/45	3	0	0	3	0	1b
06/46	2	0	1	1	0	1b
06/47	16	1	4	11	0	1b
06/48	8	0	2	6	0	1b
06/49	26	1	6	11	8	1b
06/50	12	0	4	8	0	1b
06/51	174	28	37	97	12	1b
06/52	16	2	6	3	5	1b
06/53	49	2	0	24	23	1b
06/54	11	2	2	6	1	1b
06/55	7	0	0	4	3	1b
06/56	39	0	3	3	33	1b
06/57	0	0	0	0	0	1b
07/16	4	0	1	2	1	3a
07/17	5	0	0	0	5	3a
07/18	10	1	2	7	0	1b
07/19	11	1	3	7	0	1b
07/20	147	17	13	108	9	1b
07/21	11	3	4	4	0	1b
07/22	4	0	1	2	1	3b
07/23	1	0	0	1	0	3b
07/24	0	0	0	0	0	3b
07/25	0	0	0	0	0	3b
07/26	0	0	0	0	0	1a
07/27	6	3	1	2	0	1a

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
07/28	1	0	0	1	0	1a
07/29	1	0	0	1	0	1a
07/30	1	0	1	0	0	1a
07/31	5	2	0	3	0	1a
07/32	5	1	0	4	0	1a
07/33	5	1	2	2	0	1a
07/34	3	0	0	3	0	1a
07/35	18	3	3	10	2	1a
07/36	20	12	1	6	1	1a
07/37	12	1	3	8	0	1a
07/38	1	0	0	1	0	1a
07/39	4	0	3	1	0	1a
07/40	18	9	5	4	0	1a
07/41	7	0	2	0	5	1a
07/43	3	0	1	2	0	1b
07/44	0	0	0	0	0	1b
07/45	6	0	2	4	0	1b
07/46	9	0	0	8	1	1b
07/47	5	0	1	4	0	1b
07/48	4	0	2	2	0	1b
07/49	8	0	1	7	0	1b
07/50	22	1	7	13	1	1b
07/51	68	6	16	42	4	1b
07/52	26	2	1	14	9	1b
07/53	13	1	2	9	1	1b
07/54	16	0	9	2	5	1b
07/55	18	0	2	12	4	1b
07/56	4	0	1	1	2	1b
07/57	13	0	2	3	8	1b
08/16	0	0	0	0	0	3a
08/17	1	0	0	1	0	3a
08/18	2	0	0	2	0	3a
08/19	26	0	2	4	20	3a
08/20	2	0	1	1	0	3b
08/21	3	0	0	3	0	3b
08/22	6	0	2	3	1	3b
08/23	0	0	0	0	0	3b
08/24	2	2	0	0	0	3b
08/25	0	0	0	0	0	3b
08/26	7	1	0	1	5	3b
08/27	1	0	0	1	0	3b
08/28	7	0	0	2	5	1a
08/29	1	0	1	0	0	1a
08/30	33	8	5	4	16	1a
08/31	1	1	0	0	0	1a
08/32	41	0	0	1	40	1a
08/33	3	0	2	1	0	1a
08/34	5	2	1	2	0	1a
08/35	251	34	24	171	22	1a
08/36	63	18	21	23	1	1a
08/37	66	3	3	58	2	1a
08/38	148	5	6	76	61	1a

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
08/39	64	8	6	49	1	1a
08/40	3	0	0	3	0	1b
08/41	4	1	1	2	0	1b
08/42	2	1	0	1	0	3b
08/43	21	4	0	6	11	1b
08/44	1	1	0	0	0	1b
08/45	0	0	0	0	0	1b
08/46	21	17	0	4	0	1b
08/47	28	3	4	15	6	1b
08/48	17	2	3	9	3	1b
08/49	8	2	1	3	2	1b
08/50	22	4	2	11	5	1b
08/51	9	1	4	4	0	1b
08/52	25	3	4	14	4	1b
08/53	11	4	0	0	7	3b
08/54	44	2	3	10	29	3b
08/55	168	17	19	29	103	1b
08/56	20	0	3	8	9	1b
08/57	3	1	1	1	0	1b
09/27	0	0	0	0	0	3b
09/28	0	0	0	0	0	1a
09/29	0	0	0	0	0	1a
09/30	0	0	0	0	0	1a
09/31	1	0	0	1	0	1a
09/32	1	1	0	0	0	1a
09/33	8	0	7	1	0	1a
09/34	23	4	9	10	0	1a
09/35	32	2	7	20	3	1a
09/36	26	1	15	10	0	1a
09/37	19	1	6	12	0	1a
09/38	269	7	7	216	39	1a
09/39	17	2	3	12	0	1a
09/40	24	4	4	16	0	1a
09/41	10	0	2	7	1	1a
09/46	66	0	2	11	53	3b
09/47	189	14	14	76	85	1b
09/48	16	1	2	3	10	1b
09/49	23	3	3	9	8	1b
09/50	1	0	1	0	0	1b
09/51	21	1	4	8	8	1b
09/52	2	0	0	1	1	3b
01/27	1	0	0	1	0	3b
01/28	0	0	0	0	0	3b
10/29	0	0	0	0	0	3b
10/30	2	0	0	2	0	1b
10/31	5	3	1	1	0	1b
10/32	7	2	0	4	1	1b
10/33	12	6	3	2	1	1a
10/34	59	13	10	23	13	1a
10/35	80	4	7	49	20	1a
10/36	58	4	7	36	11	1a
10/37	13	1	1	11	0	1a

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
10/38	14	0	1	13	0	1a
10/39	19	1	5	8	5	1b
10/40	8	0	2	6	0	1b
10/41	6	1	2	3	0	3b
10/49	3	1	1	1	0	1b
10/50	15	1	7	7	0	1b
10/51	21	0	6	8	7	1b
10/52	3	0	1	2	0	3b
11/29	0	0	0	0	0	3b
11/30	2	0	0	1	1	3b
11/31	6	0	0	3	3	1b
11/32	15	0	5	5	5	1b
11/33	22	5	3	10	4	1b
11/34	42	12	4	16	10	1b
11/35	146	13	28	104	1	1a
11/36	27	0	11	15	1	1a
11/37	7	1	5	1	0	1b
11/38	23	6	6	11	0	1b
11/39	9	0	1	8	0	1b
11/40	1	0	0	1	0	1b
12/31	0	0	0	0	0	1b
12/32	13	1	2	10	0	1b
12/33	378	13	37	288	40	1b
12/34	4	2	2	0	0	1b
12/35	56	2	5	35	14	1b
12/36	18	2	7	7	2	1b
12/37	18	2	3	12	1	1b
12/38	10	1	4	5	0	1b
12/39	12	2	2	3	5	3b
13/31	91	21	14	52	4	1b/3b
13/32	264	12	34	153	65	1b
13/33	275	9	21	197	48	1b
13/34	2	0	2	0	0	1b
13/35	4	2	0	2	0	1b
13/36	21	3	4	9	5	1b
13/37	12	1	1	10	0	1b
13/38	10	2	3	3	2	1b
13/39	6	0	1	1	4	3b/1b
14/31	190	14	21	111	44	1b
14/32	138	12	9	85	32	1b
14/33	56	0	10	31	15	1b
14/34	132	4	14	104	10	1b
14/35	44	7	8	24	5	1b
14/36	42	7	4	19	12	1b/3b
15/16	4	2	0	2	0	3a
15/17	3	3	0	0	0	3a
15/18	1	1	0	0	0	3a
15/19	2	2	0	0	0	3a
15/21	2	2	0	0	0	3a
15/24	3	3	0	0	0	3a
15/25	1	0	1	0	0	3b
15/28	4	0	2	0	2	3b

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
15/29	1	0	0	1	0	3b
15/30	4	0	0	3	1	3b
15/31	3	0	1	2	0	1b
15/32	6	0	0	3	3	1b
15/33	19	5	3	7	4	1b
15/34	11	0	4	7	0	1b
15/35	9	0	4	5	0	1b
15/36	2	0	0	2	0	1b/3b
15/38	7	0	1	5	1	3b
15/39	33	3	6	22	2	3b
15/40	2	1	0	1	0	3b
15/41	56	0	11	24	21	3b
15/42	2	0	1	1	0	3b
15/43	4	0	2	2	0	3b
15/44	2	0	0	2	0	3b
15/45	1	0	0	1	0	3b
15/46	3	2	0	1	0	3b
15/47	2	0	1	1	0	3b
15/49	3	0	0	3	0	3b
15/50	1	1	0	0	0	3b
15/52	4	0	0	4	0	3b
15/53	1	0	0	1	0	3b
16/00	100	3	9	87	1	1d
16/01	61	26	8	18	9	1d
16/02	25	17	1	0	7	1d
16/03	20	13	1	1	5	1d
16/04	7	5	0	2	0	1d
16/05	6	0	1	4	1	1d
16/06	3	0	0	3	0	1a/1d
16/07	73	40	1	13	19	1a
16/08	24	7	1	14	2	1a
16/09	9	1	0	7	1	1a
16/10	25	0	1	24	0	1a
16/11	1	0	0	1	0	1a
16/12	0	0	0	0	0	3a
16/13	0	0	0	0	0	3a
16/14	0	0	0	0	0	3a
16/15	0	0	0	0	0	3a
16/16	0	0	0	0	0	3a
16/17	0	0	0	0	0	3a
16/18	0	0	0	0	0	3a
16/19	0	0	0	0	0	3a
16/20	0	0	0	0	0	3a
16/21	0	0	0	0	0	3a
16/22	0	0	0	0	0	3a
16/23	0	0	0	0	0	3a/3b
16/24	0	0	0	0	0	3b
16/25	0	0	0	0	0	3b
16/26	1	0	1	0	0	3b
16/27	0	0	0	0	0	3b
16/28	4	0	3	0	1	3b
16/29	0	0	0	0	0	3b

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
16/30	1	0	0	1	0	3b
16/31	1	0	1	0	0	3b
16/32	56	0	2	1	53	3b
16/33	11	0	1	3	7	3b/1b
16/34	17	1	1	12	3	1b
16/35	9	0	1	8	0	1b
16/36	2	0	1	1	0	1b/3b
16/37	0	0	0	0	0	3b
16/38	1	0	0	1	0	3b
16/39	0	0	0	0	0	3b
16/40	1	0	1	0	0	3b
16/41	0	0	0	0	0	3b
16/42	0	0	0	0	0	3b
16/43	1	0	0	1	0	3b
16/44	0	0	0	0	0	3b
16/45	5	0	1	4	0	3b
16/46	0	0	0	0	0	3b
16/47	0	0	0	0	0	3b
16/48	0	0	0	0	0	3b
16/49	0	0	0	0	0	3b
16/50	0	0	0	0	0	3b
16/51	0	0	0	0	0	3b
16/52	3	0	0	3	0	3b
16/53	0	0	0	0	0	3b
16/54	0	0	0	0	0	3b
16/55	6	2	1	1	2	3b
16/56	0	0	0	0	0	3b
16/57	0	0	0	0	0	3b
17/01	0	0	0	0	0	1d
17/02	2	0	0	1	1	1d
17/03	1	0	0	1	0	1d
17/04	2	0	0	2	0	1d
17/05	25	5	2	18	0	1d
17/06	2	0	1	1	0	1a/1c
17/07	49	20	6	23	0	1a
17/08	14	4	5	4	1	1a
17/09	9	4	2	1	2	1a
17/10	3	1	0	1	1	1a
17/11	0	0	0	0	0	1a
17/22	1	0	0	1	0	3a
17/26	5	0	1	3	1	3b
17/27	4	0	0	4	0	3b
17/28	8	0	2	6	0	3b
17/29	68	2	3	28	35	3b
17/30	1	0	0	1	0	3b
17/31	1	0	0	1	0	3b
17/32	6	1	0	5	0	3b/1b
17/33	1	0	0	1	0	1b
17/34	1	0	1	0	0	1b
17/35	13	0	1	11	1	1b
17/36	6	0	2	1	3	1b
17/37	5	2	0	3	0	3b

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
17/38	2	0	1	0	1	3b
17/40	6	0	1	5	0	3b
17/42	6	1	3	2	0	3b
17/44	4	0	1	3	0	3b
17/47	1	0	0	1	0	3b
17/49	1	0	0	1	0	3b
17/50	1	0	0	1	0	3b
17/51	19	0	0	12	7	3b
17/53	1	0	0	1	0	3b
17/57	0	0	0	0	0	3b
18/00	11	4	2	5	0	1d
18/01	6	2	1	3	0	1d
18/02	27	2	2	6	17	1a/1d
18/03	7	5	0	2	0	1a/1d
18/04	8	0	2	2	4	1a
18/05	30	11	1	18	0	1a
18/06	11	0	2	2	7	1a
18/07	25	14	1	9	1	1a
18/08	15	3	1	9	2	1a
18/09	6	1	0	3	2	1a
18/10	20	7	1	10	2	1a/1c
18/11	3	0	0	0	3	1a
18/32	0	0	0	0	0	3b
18/33	8	0	2	2	4	1b/3c
18/34	7	0	0	4	3	1b
18/35	45	2	7	20	16	1b
18/36	18	0	0	12	6	1b/3c
18/37	7	3	2	2	0	1b/3c
18/38	7	0	0	3	4	3c
19/00	20	7	2	11	0	1a
19/01	36	32	1	3	0	1a
19/02	41	9	10	4	18	1a
19/03	23	1	5	17	0	1a
19/04	18	2	6	8	2	1a
19/05	40	12	11	14	3	1a
19/06	25	11	2	5	7	1a
19/07	38	13	4	14	7	1a
19/08	3	0	0	3	0	1c
19/09	4	0	1	3	0	1c
19/10	35	3	5	23	4	1c/1a
19/11	53	1	4	45	3	1a
19/32	0	0	0	0	0	3c
19/33	4	0	2	2	0	1b/3c
19/34	5	1	1	3	0	1b/3c
19/35	23	3	7	11	2	1b
19/36	8	0	1	7	0	1b
19/37	4	0	1	1	2	3c/1b
19/38	5	1	1	1	2	3c
20/00	15	2	2	11	0	1b
20/01	14	11	0	3	0	1b
20/02	3	1	1	1	0	1b
20/03	11	3	2	5	1	1c/1b

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
20/04	17	0	1	16	0	1c
20/05	35	9	3	20	3	1c
20/06	9	3	1	2	3	1c
20/07	32	10	0	15	7	1c
20/08	5	0	1	4	0	1c
20/09	1	0	0	1	0	1c
20/10	9	2	2	4	1	1c
20/11	35	17	4	13	1	1b
20/12	0	0	0	0	0	1c
20/13	0	0	0	0	0	1b
20/14	0	0	0	0	0	1b
21/00	6	1	0	5	0	1b
21/01	5	1	1	3	0	1b
21/02	4	0	0	0	4	1b
21/03	5	0	0	2	3	1b
21/04	1	0	0	0	1	1b
21/05	5	0	1	2	2	1b
21/06	2	1	0	0	1	1b
21/07	255	30	24	124	77	1c
21/08	2	0	0	1	1	1c
21/09	6	1	1	1	3	1c
21/10	9	3	0	3	3	1c
21/11	8	2	2	4	0	1c
21/12	0	0	0	0	0	1c
22/00	43	15	3	25	0	1b
22/01	223	49	5	167	2	1b
22/02	1	0	0	1	0	1b
22/03	12	0	0	3	9	1b
22/04	10	0	0	8	2	1c/1b
22/05	10	0	2	4	4	1c/1b
22/06	10	4	0	5	1	1c
22/07	0	0	0	0	0	1c
22/08	15	4	0	7	4	1c
22/09	67	5	12	20	30	1c
22/10	1	1	0	0	0	1c
22/11	18	8	1	4	5	1c
22/12	3	2	0	1	0	1c
22/13	0	0	0	0	0	3a
22/14	0	0	0	0	0	3a
22/15	0	0	0	0	0	3a
22/16	0	0	0	0	0	3a
22/17	0	0	0	0	0	3a
22/18	0	0	0	0	0	3a
22/19	0	0	0	0	0	3a
22/20	2	0	1	1	0	3a
22/21	0	0	0	0	0	3a
22/22	0	0	0	0	0	3a
22/23	0	0	0	0	0	3a/3b
22/24	6	0	0	6	0	3b
22/25	0	0	0	0	0	3b
22/26	5	2	2	1	0	3b
22/27	11	0	2	2	7	3b

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
22/28	2	1	0	1	0	3b
22/29	5	0	2	3	0	3b
22/30	2	1	0	1	0	3b
22/31	1	0	0	1	0	3b
22/32	6	0	0	2	4	3b
22/33	0	0	0	0	0	3b
22/34	10	0	0	0	10	3b
22/35	4	0	2	2	0	3b
22/36	25	1	2	10	12	3b
22/37	23	0	0	11	12	3a
22/38	4	0	0	4	0	3a
22/39	3	0	0	3	0	3b
22/40	3	0	0	3	0	3b
22/41	1	0	1	0	0	3b
22/42	1	0	0	1	0	3b
22/43	0	0	0	0	0	3b
22/44	5	0	0	0	5	3b
22/45	0	0	0	0	0	3b
22/46	5	0	1	4	0	3b
22/47	0	0	0	0	0	3b
22/48	0	0	0	0	0	3b
22/49	0	0	0	0	0	3b
22/50	0	0	0	0	0	3b
22/51	0	0	0	0	0	3b
22/52	0	0	0	0	0	3b
22/53	0	0	0	0	0	3c
22/54	0	0	0	0	0	3c
22/55	0	0	0	0	0	3c
22/56	0	0	0	0	0	3c
22/57	0	0	0	0	0	3c
23/00	75	13	0	62	0	1a
23/01	130	0	5	125	0	1a
23/02	6	0	1	1	4	1b
23/03	5	0	1	3	1	1b
23/04	2	0	0	2	0	1b
23/05	17	0	4	0	13	1b
23/06	0	0	0	0	0	1b/2
23/07	3	0	1	2	0	1b/2
23/08	18	10	0	5	3	1b/1c
23/09	275	1	5	17	252	1c
23/10	52	8	4	8	32	1c
23/11	295	18	21	44	212	1c
23/12	77	7	5	48	17	1c
23/13	4	4	0	0	0	3a
23/14	2	0	1	1	0	3a
23/15	5	0	3	1	1	3a
23/16	0	0	0	0	0	3a
23/17	0	0	0	0	0	3a
23/18	0	0	0	0	0	3a
23/19	0	0	0	0	0	3a
23/20	1	0	1	0	0	3b
23/21	6	0	3	3	0	3b

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
23/22	0	0	0	0	0	3b
23/23	0	0	0	0	0	3b
23/24	0	0	0	0	0	3b
23/25	3	0	0	3	0	3b
23/26	2	0	0	1	1	3b
23/27	1	0	0	1	0	3b
23/28	0	0	0	0	0	3b
23/29	0	0	0	0	0	3b
23/30	3	0	0	1	2	3b
23/31	16	0	1	13	2	3b
23/32	19	4	2	3	10	3b
23/33	4	0	2	2	0	3b
23/34	0	0	0	0	0	3b
23/35	4	0	0	4	0	3b
23/36	1	0	0	1	0	3b
23/37	6	2	1	2	1	3b
23/38	4	0	1	0	3	3b
23/39	2	1	0	1	0	3b
23/40	1	0	0	1	0	3b
23/41	1	0	0	1	0	3b
23/42	0	0	0	0	0	3b
23/43	0	0	0	0	0	3b
23/44	0	0	0	0	0	3b
23/45	1	0	0	1	0	3b
23/46	0	0	0	0	0	3b
23/47	38	3	3	7	25	3b
23/48	0	0	0	0	0	3b
23/49	0	0	0	0	0	3b
23/50	0	0	0	0	0	3b
23/51	2	0	0	2	0	3c
23/52	0	0	0	0	0	3c
23/53	0	0	0	0	0	3c
23/54	0	0	0	0	0	3c
23/55	0	0	0	0	0	3c
23/56	0	0	0	0	0	3c
23/57	0	0	0	0	0	3c
24/00	15	1	0	2	12	1a
24/01	11	0	2	3	6	1a
24/02	15	2	2	6	5	1b
24/03	5	1	0	4	0	1b
24/04	6	2	0	4	0	1b
24/05	1	0	0	1	0	1b/1c
24/06	4	1	0	0	3	1c
24/07	19	4	2	13	0	1c
24/08	17	2	3	12	0	1c
24/09	14	3	1	10	0	1c
24/10	12	3	1	8	0	1c
24/11	18	4	3	6	5	1c
24/12	9	3	2	4	0	1c
24/15	90	6	11	48	25	3a
24/16	5	0	0	5	0	3a
24/17	0	0	0	0	0	3a

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
24/18	0	0	0	0	0	3a
24/19	0	0	0	0	0	3a
24/20	0	0	0	0	0	3a
24/21	0	0	0	0	0	3a
24/22	0	0	0	0	0	3a
24/23	0	0	0	0	0	3a
24/24	0	0	0	0	0	3a
24/25	1	0	0	1	0	3a
24/26	2	0	0	2	0	3a
24/27	0	0	0	0	0	3a
24/28	0	0	0	0	0	3a
24/29	2	0	0	2	0	3a
24/30	0	0	0	0	0	3a
24/31	1	0	0	1	0	3a
24/32	0	0	0	0	0	3a
24/33	0	0	0	0	0	3a
24/34	1	1	0	0	0	3a
24/35	0	0	0	0	0	3a
24/36	2	0	2	0	0	3a
24/37	6	0	2	4	0	3a
24/38	2	1	0	1	0	3a
24/39	1	0	0	1	0	3a
24/40	1	0	1	0	0	3a
24/41	0	0	0	0	0	3a
24/42	4	0	1	3	0	3a
24/43	0	0	0	0	0	3a
24/44	30	0	7	13	10	3a
24/45	3	0	0	1	2	3a
24/46	1	0	1	0	0	3a
24/47	0	0	0	0	0	3a
24/48	1	0	1	0	0	3a
24/49	0	0	0	0	0	3a
24/50	0	0	0	0	0	3a
24/51	0	0	0	0	0	3a
24/52	1	0	0	1	0	3a
24/53	4	0	1	1	2	3a
24/54	0	0	0	0	0	3a
24/55	1	0	0	1	0	3a
24/56	0	0	0	0	0	3a
24/57	1	0	0	1	0	3a
25/00	14	0	1	13	0	1c/1a
25/01	21	5	7	9	0	1c/1a
25/02	8	0	0	4	4	1c
25/03	30	19	2	9	0	1c
25/04	28	4	2	22	0	1c
25/05	22	0	2	20	0	1c
25/06	30	4	5	20	1	1c
25/07	11	2	2	5	2	1c
25/08	11	1	1	9	0	1c
25/09	14	4	1	9	0	1c
25/10	5	1	1	3	0	1c
25/11	44	4	15	21	4	1c

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
25/12	15	1	1	12	1	1c
25/15	215	11	22	117	65	1a
25/40	0	0	0	0	0	3c
25/41	0	0	0	0	0	3c
25/42	7	0	1	5	1	1b/3c
25/43	4	1	2	1	0	1b/3c
25/44	62	9	9	29	15	1b/3c
25/45	132	1	6	56	69	1b/3c
26/00	18	12	0	6	0	1a
26/01	5	0	1	4	0	1a
26/02	19	5	6	8	0	1a
26/03	14	4	5	4	1	1a
26/04	34	9	5	20	0	1a
26/05	2	0	1	1	0	1a
26/06	18	2	1	15	0	1a
26/07	0	0	0	0	0	1a
26/08	3	1	0	2	0	1a
26/09	5	0	0	5	0	1a
26/10	11	0	4	7	0	1a
26/11	92	5	15	64	8	1a
26/12	303	11	25	248	19	1a
26/13	12	2	0	9	1	1a
26/14	7	0	1	5	1	1a
26/15	29	3	6	20	0	1a/3b
26/16	36	5	5	22	4	2/3b
26/38	3	0	0	3	0	1b
26/39	3	0	0	3	0	1b
26/40	3	0	1	2	0	1b
26/41	8	2	2	2	2	1b
26/42	3	0	0	3	0	1b/3c
26/43	81	17	10	49	5	1b/3c
26/44	246	11	31	170	34	1b/3c
26/45	15	0	3	7	5	1b/3c
27/00	43	37	2	4	0	1a
27/01	17	5	1	7	4	1a
27/02	60	24	16	20	0	1a
27/03	65	31	11	22	1	1a
27/04	339	9	34	162	134	1a
27/05	42	1	4	25	12	1a
27/06	15	2	2	10	1	1a
27/07	24	19	1	4	0	1a
27/08	64	33	4	26	1	1a
27/09	19	0	4	15	0	1a
27/10	38	0	5	29	4	1a
27/11	900	24	65	782	29	1a
27/12	621	29	73	471	48	1a
27/13	211	3	16	190	2	1a
27/14	58	17	4	36	1	1a
27/15	215	14	18	167	16	1a/3a
27/16	43	2	1	23	17	1a
27/17	4	0	1	3	0	1a
27/38	2	0	1	1	0	1b/3c

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
27/39	1	0	0	1	0	1b/3c
27/40	1	0	1	0	0	1b/3c
27/41	11	2	1	7	1	1b
27/42	15	2	1	12	0	1b
27/43	25	2	3	18	2	1b
27/44	34	6	5	20	3	1b
27/45	2	0	1	1	0	1b
28/00	114	26	17	65	6	1a
28/01	27	11	4	12	0	1c
28/02	147	35	12	66	34	1c
28/03	260	20	31	192	17	1c
28/04	67	12	6	46	3	1a
28/05	26	6	1	16	3	1a
28/06	19	6	6	7	0	1a
28/07	12	2	1	7	2	1a
28/08	43	1	8	32	2	1a
28/09	151	13	9	123	6	1a
28/10	217	11	26	168	12	1a
28/11	23	3	4	16	0	1a
28/12	16	0	5	11	0	1a
28/13	8	0	3	5	0	1a
28/14	189	0	16	170	3	1a
28/15	31	6	6	14	5	1a
28/16	130	1	7	44	78	1a
28/17	6	2	2	2	0	1a
28/38	2	0	0	2	0	1b/3c
28/39	3	0	1	0	2	1b
28/40	2	0	1	1	0	1b
28/41	13	0	3	10	0	1b
28/42	11	0	0	10	1	1b
28/43	241	38	24	75	104	1b/3c
28/44	6	1	2	2	1	3c
28/45	5	1	1	3	0	3c
29/06	2	0	1	1	0	1a
29/07	4	2	0	2	0	1a
29/08	5	0	2	3	0	1a
29/09	11	6	2	3	0	1a
29/10	28	2	2	24	0	1a
29/11	8	0	0	8	0	1a
29/12	47	0	4	40	3	1a
29/13	31	0	5	24	2	1a
29/14	315	2	29	279	5	1a
29/15	58	4	5	48	1	1a
29/16	21	0	2	17	2	1a
29/17	53	5	5	29	14	1a/3b
29/18	46	5	3	31	7	1a/3b
29/38	5	1	2	1	1	1b
29/39	4	0	1	3	0	1b
29/40	20	7	4	9	0	1b
29/41	12	0	1	11	0	1b
29/42	5	1	0	3	1	1b
29/43	4	2	0	2	0	1b

Table E.1, continued

$100m^2$ Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
29/44	1	0	1	0	0	1b/3c
29/45	0	0	0	0	0	3c
30/00	594	5	31	519	39	1a
30/01	36	1	11	20	4	1a
30/02	80	18	7	34	21	1a
30/03	149	24	19	91	15	1a
30/04	499	16	70	359	54	1a
30/05	31	10	3	15	3	1a
30/06	78	2	1	75	0	1a
30/07	10	4	0	6	0	1a
30/08	14	3	1	9	1	1a
30/09	13	1	1	11	0	1a
30/10	8	0	1	7	0	1a
30/11	55	6	3	44	2	1a
30/12	63	14	13	36	0	1a
30/13	7	1	1	5	0	1a
30/14	1	0	0	1	0	1a
30/15	8	0	0	8	0	1a
30/16	13	1	4	8	0	1a
30/17	15	3	1	11	0	1a
30/18	18	1	1	11	5	1a
30/19	2	0	0	0	2	1a
30/20	3	0	1	2	0	3c/1a
30/31	1	0	1	0	0	3b
30/37	1	0	0	1	0	3b
30/42	10	1	0	8	1	1a
30/47	5	0	0	4	1	3c
30/50	9	6	0	3	0	3c
30/54	1	0	0	1	0	3c
30/57	1	0	0	1	0	3c
31/00	219	4	11	191	13	1a
31/01	29	6	5	13	5	1a
31/02	9	4	0	5	0	1a
31/03	85	5	17	57	6	1a
31/04	120	11	2	86	21	1a
31/05	45	1	0	43	1	1a
31/06	6	1	0	5	0	1a
31/07	36	10	7	17	2	1a
31/08	5	0	0	5	0	1a
31/09	117	29	13	75	0	1a
31/10	65	3	2	59	1	1a
31/11	10	1	0	7	2	1a
31/12	7	0	2	5	0	1a
31/13	2	0	0	2	0	1a
31/14	33	0	0	6	27	1a
31/15	7	0	0	7	0	1a
31/16	0	0	0	0	0	1a
31/17	0	0	0	0	0	1a
31/18	1	0	0	1	0	1a
31/19	2	0	1	0	1	1a/3b
31/20	0	0	0	0	0	3b
31/21	0	0	0	0	0	3b

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
31/22	0	0	0	0	0	3b
31/23	0	0	0	0	0	3b
31/24	0	0	0	0	0	3b
31/25	1	0	1	0	0	3b
31/26	1	0	0	1	0	3b
31/27	1	0	0	1	0	3b
31/28	0	0	0	0	0	3b
31/29	0	0	0	0	0	3b
31/30	0	0	0	0	0	3b
31/31	0	0	0	0	0	3b
31/32	0	0	0	0	0	3b
31/33	6	0	0	1	5	3b
31/34	15	0	1	2	12	3b
31/35	4	0	0	3	1	3b
31/36	0	0	0	0	0	3b
31/37	2	0	1	1	0	3b
31/38	1	0	1	0	0	3b/2
31/39	3	0	1	2	0	2/1a
31/40	51	4	6	27	14	2/1a
31/41	30	0	4	19	7	2/1a
31/42	71	0	7	22	42	2/1a
31/43	58	2	1	11	44	2/1a
31/44	0	0	0	0	0	2/1a
31/45	1	0	0	1	0	1a/3c
31/46	0	0	0	0	0	1a/3c
31/47	16	1	3	6	6	3c
31/48	1	1	0	0	0	3c
31/49	0	0	0	0	0	3c
31/50	3	0	0	3	0	3c
31/51	1	0	0	1	0	3c
31/52	1	1	0	0	0	3c
31/53	1	0	1	0	0	3c
31/54	0	0	0	0	0	3c
31/55	4	1	0	1	2	3c
31/56	0	0	0	0	0	3c
31/57	0	0	0	0	0	3c
32/16	11	6	1	2	2	1a
32/17	9	3	1	5	0	1a
32/18	6	0	1	5	0	1a
32/19	3	0	0	3	0	1a
32/20	0	0	0	0	0	1a
32/21	6	0	0	2	4	3a
32/25	6	0	0	1	5	3b
32/30	4	0	0	0	4	3b
32/35	2	0	0	2	0	3b
32/39	3	1	0	1	1	3b
32/50	5	1	0	2	2	3c
32/51	8	5	0	2	1	3c
32/52	8	2	2	3	1	3c
32/54	2	0	0	0	2	3c
33/16	20	0	3	17	0	1a
33/17	19	3	3	13	0	1a

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
33/18	17	2	4	9	2	1a
33/19	4	1	1	1	1	1a
33/46	0	0	0	0	0	1a
34/17	4	1	3	0	0	1a
34/18	4	0	0	4	0	1a
34/19	15	1	3	11	0	1a
34/20	3	0	0	3	0	1a
35/16	6	1	1	4	0	1a
35/17	2	0	0	2	0	1a
35/18	6	1	1	4	0	1a
35/19	10	2	1	6	1	1a
35/20	3	1	1	1	0	3b/1a
35/21	0	0	0	0	0	3b
35/22	0	0	0	0	0	3b
36/16	6	2	0	4	0	1a
36/17	1	0	0	0	1	1a
36/18	4	0	0	4	0	1a
36/19	2	0	0	2	0	1a
36/20	8	1	1	6	0	1a/3b
36/21	3	0	0	3	0	3b
36/22	0	0	0	0	0	3b
38/16	0	0	0	0	0	1a
38/17	0	0	0	0	0	1a
38/18	0	0	0	0	0	1a
38/19	0	0	0	0	0	1a
38/20	0	0	0	0	0	1a/2
38/21	0	0	0	0	0	1a/2
38/22	28	2	0	11	15	2
38/23	71	3	9	35	24	2
38/24	0	0	0	0	0	2
38/25	1	0	1	0	0	2
38/26	7	3	1	3	0	2
38/27	0	0	0	0	0	2
38/28	0	0	0	0	0	2
38/29	0	0	0	0	0	2
38/30	0	0	0	0	0	2
38/31	0	0	0	0	0	2/3a
39/16	0	0	0	0	0	1a
39/17	0	0	0	0	0	1a
39/18	1	0	0	1	0	1a
39/19	2	0	1	1	0	1a
39/20	1	0	0	1	0	1a/2
39/21	1	0	1	0	0	1a/2
39/22	11	0	1	3	7	2
39/23	26	0	2	18	6	2
39/24	0	0	0	0	0	2
39/25	1	0	1	0	0	2
39/27	0	0	0	0	0	2
39/28	0	0	0	0	0	2
39/29	0	0	0	0	0	2
39/30	3	0	3	0	0	2
39/31	1	0	0	1	0	2/3a

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
40/16	0	0	0	0	0	1a
40/20	66	9	8	45	4	1a
40/25	5	0	0	0	5	1a
40/36	1	0	0	0	1	3a
42/16	1	0	1	0	0	1a
42/17	1	0	0	1	0	1a
42/18	1	1	0	0	0	1a
42/19	4	1	1	2	0	1a
42/20	51	9	12	30	0	1a
42/21	17	4	5	8	0	1b
42/22	7	2	1	4	0	2/1b
42/23	11	0	1	0	10	2/1b
42/24	11	0	1	3	7	2/1b
42/25	6	3	1	2	0	2/1b
42/26	11	1	2	8	0	3a/2
42/27	0	0	0	0	0	3a
42/28	2	1	1	0	0	3a
42/29	0	0	0	0	0	3a
42/30	0	0	0	0	0	3a
43/16	9	1	5	3	0	1a
43/17	0	0	0	0	0	1a
43/18	4	0	0	4	0	1a/1b
43/19	9	1	1	7	0	1b
43/20	7	0	1	6	0	1b
43/21	5	1	0	3	1	1b
43/22	4	1	0	3	0	1b/2
43/23	3	0	1	2	0	1b/2
43/24	3	0	0	1	2	1b/2
43/25	28	17	2	9	0	2
43/26	16	2	8	5	1	2
43/27	14	0	0	8	6	2/3a
43/28	5	3	0	2	0	2/3a
43/29	0	0	0	0	0	2/3a
43/30	3	1	0	1	1	3a
44/16	2	0	0	2	0	1a
44/17	3	0	0	3	0	1b/1a
44/18	16	2	2	12	0	1b
44/19	19	0	4	14	1	1b
44/20	58	5	4	23	26	1b
44/21	25	0	1	24	0	1b
44/22	5	2	0	3	0	1b
44/23	4	1	1	2	0	2/1b
44/24	0	0	0	0	0	2/1b
44/25	2	0	2	0	0	2/1b
44/26	6	0	4	2	0	2/1b
44/27	8	2	3	3	0	2
44/28	5	0	1	2	2	2
44/29	3	1	0	1	1	2
44/30	4	1	0	3	0	2/3a
44/31	2	1	0	1	0	2/3a
45/16	1	0	1	0	0	1b
45/17	0	0	0	0	0	1b

Table E.1, continued

100m^2 Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
45/18	2	0	0	1	1	1b
45/19	1	0	0	0	1	1b
45/20	2	0	0	2	0	1b
45/21	3	2	0	1	0	1b
45/22	1	0	1	0	0	1b
45/23	2	1	0	1	0	1b
45/24	2	1	0	1	0	1b/2
45/25	9	1	1	7	0	2/1b
45/26	12	0	4	8	0	2/1b
45/27	33	3	6	17	7	2/1b
45/28	48	4	2	13	29	2/1b
45/29	34	5	3	10	16	2
45/30	7	1	1	3	2	2/3a
45/31	2	0	1	0	1	2/3a
46/16	1	0	1	0	0	1b
46/17	26	0	3	12	11	1b
46/18	53	5	32	16	0	1b
46/19	38	8	1	9	20	1b
46/20	1	0	0	0	1	1b
46/21	11	0	1	10	0	1b
46/22	7	0	0	7	0	1b
46/23	10	5	1	4	0	1b
46/24	15	1	2	12	0	1b
46/25	34	1	0	30	3	1b
46/26	103	18	13	47	25	1b
46/27	30	0	3	13	14	1b
46/28	40	0	0	21	19	1b
46/29	5	1	0	1	3	2/1b
46/30	0	0	0	0	0	2
46/31	0	0	0	0	0	2/3a
46/32	2	1	0	1	0	3a
46/33	0	0	0	0	0	3a
46/34	1	0	0	1	0	3a
46/35	0	0	0	0	0	3a
46/36	0	0	0	0	0	3a
46/37	2	2	0	0	0	3a
46/38	0	0	0	0	0	3b
46/39	8	0	1	6	1	3b
46/40	1	0	0	1	0	3b
46/41	0	0	0	0	0	3b
46/42	0	0	0	0	0	3b
46/43	0	0	0	0	0	3b
46/44	0	0	0	0	0	3b
46/45	0	0	0	0	0	3b
46/46	0	0	0	0	0	3b
46/47	1	0	0	1	0	3d/3b
46/48	0	0	0	0	0	3d
46/49	0	0	0	0	0	3d
46/50	2	0	0	2	0	3d
46/51	0	0	0	0	0	3d
46/52	2	0	0	2	0	3d
46/53	0	0	0	0	0	3d

Table E.1, continued

100m² Unit	Total Artifacts	Fire-Altered Rocks	Ground Stone	Chipped Stone	Ceramic Artifacts	Geologic Zone
46/54	0	0	0	0	0	3d
46/55	0	0	0	0	0	3d
46/56	0	0	0	0	0	3d
46/57	0	0	0	0	0	3d
47/16	0	0	0	0	0	1b
47/17	9	0	0	0	9	1b
47/18	22	0	2	10	10	1b
47/19	9	2	0	1	6	1b
47/20	3	1	0	2	0	1b
47/21	12	0	1	4	7	1b
47/22	3	0	0	3	0	1b
47/23	11	0	0	11	0	1b
47/24	100	0	2	98	0	1b
47/25	18	0	2	16	0	1b
47/26	17	2	0	10	5	1b
47/27	25	3	2	18	2	1b
47/28	33	5	4	18	6	1b
47/29	20	2	1	4	13	2
47/30	4	1	1	1	1	2
47/31	2	1	0	1	0	2
47/32	0	0	0	0	0	2/3a
47/33	0	0	0	0	0	3a
47/34	0	0	0	0	0	3a
47/35	0	0	0	0	0	3a
47/36	0	0	0	0	0	3a
47/37	0	0	0	0	0	3a
47/38	0	0	0	0	0	3a/3b
47/39	0	0	0	0	0	3b
47/40	13	1	0	1	11	3b
47/41	1	0	1	0	0	3b
47/42	0	0	0	0	0	3b
47/43	76	3	0	2	71	3b
47/44	0	0	0	0	0	3b
47/45	0	0	0	0	0	3b
47/46	0	0	0	0	0	3b
47/47	0	0	0	0	0	3b/3d
47/48	0	0	0	0	0	3d/3b
47/49	0	0	0	0	0	3d
47/50	18	0	0	0	18	3d
47/51	0	0	0	0	0	3d
47/52	0	0	0	0	0	3d
47/53	0	0	0	0	0	3d
47/54	0	0	0	0	0	3d
47/55	0	0	0	0	0	3d
47/56	1	0	1	0	0	3d
47/57	0	0	0	0	0	3d

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